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STANDARD GENERAL KNOWLEDGE

Al-Haj
TUFAIL MUHAMMAD DOGAR

DOGAR BROTHERS
STANDARD PUBLISHERS

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Al-Haj TUFAIL MUHAMMAD DOGAR

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PREFACE TO THE TWENTY FIFTH EDITION

The book has been brought up-to-date. New chapters have been added.

It is confidently hoped that the book will suffice for all competitive examinations in General Knowledge for Civil and Military Services - Central Superior Services of Pakistan (C.S.S.P.), Civil Services of Pakistan (C.S.P.), Provincial Civil Service, Pakistan Military Academy (P.M.A), Ministerial Services, etc.,—and Interviews.

Suggestions for further improvement of the book will be welcomed.

T. M. DOGAR

PREFACE TO THE SECOND EDITION

It is gratifying to note that the second edition of "Standard General Knowledge" has been called forth within less than ten months of its publication.

The amazing speed of modern events requires a book on General Knowledge to be fully abreast of the information. Amidst a very wide appreciation from all quarters, I present the second edition of "Standard General Knowledge" It has been revised; brought up-to-date and enlarged to the extent of 72 pages. An opportunity has been taken to delineate the trend of modern events in the world and to give a panoramic and intelligent view of the world today from Korea to Morocco.

It is confidently hoped that this new edition will admirably meet the requirements of those for whom it is primarily meant.

I will welcome with thanks any suggestions for the improvement of the book.

T. M. DOGAR

FOREWORD

It gives me great pleasure to contribute a Foreword to the present work of Mr. T. M. Dogar and call attention to its numerous and valuable features, which make it specially suitable for the candidates preparing for the various competitive examinations held in Pakistan. Almost all the important subjects have been treated with due fulness and arrangement in a logical order and a coherent manner so as to hold the interest of the reader. Pakistan receives adequate treatment at the hands of the author—a very valuable feature which renders this book far superior to all others of its class. The subject-matter has been derived from a large number of authoritative works, which has been mentioned in special bibliographies, placed at the end of several chapters.

I hope the present book, which is packed with useful information on a variety of subjects, will be warmly welcomed not only by the student community but also by the general reader in search of useful knowledge about the world in which he lives.

(DR. SH.) INAYATULLAH
M.A. (Pb.) Ph. D. (London), P.E.S.

Government College,
Lahore.

FOREWORD

It is not possible for every man to know everything under the sun. Nevertheless, there are certain things in every sphere of life which a man of education ought to know, if he wants to pass for a well-informed man. The *Standard General Knowledge* is an attempt to cull these highlights of facts and events and present them in a readable form.

When the publishers asked me to write a Foreword to the book, I hesitated. A glance over its contents, however, convinced me that it is a very useful addition to our stock of knowledge. I have, therefore, pleasure in introducing the book to the reading public.

The general reader will find the book of much interest and help to add to his knowledge of facts and events. To members of the learned professions, it should serve as a book of ready reference. To students, who sit for competitive examinations or appear at interviews, it is an indispensable necessity.

As the bibliography appended to each part shows, the author has surveyed a vast range of knowledge and much pains have gone to the skimming of the cream out of that mass of books for the use of the reader.

Perhaps, it is the first attempt of its kind in Pakistan by a Pakistani. As such, it deserves additional encouragement.

MUHAMMAD YAKUB KHAN,
Editor,
The C. & M. Gazette, Lahore.

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T. M. DOGAR.

PREFACE TO THE FIRST EDITION

This book has been written to satisfy the requirements of candidates for various competitive examinations, interviews, and general reader who may be interested in "Knowledge" for its own sake. Most of them have neither the leisure nor the maturity for sifting knowledge of common interest out of the bewildering mass of facts and figures, technologies of Art and Science, etc.

There are books on "General Knowledge" but, for the most part, they are disconnected and carry no interest about them for a general reader. Even a candidate for a competitive examination may not find any interest in them. He may cram, for the time being, certain insufficiently detailed facts. Foreign books on the subject are, no doubt, comprehensive, but no one book can suffice average candidate for a competitive examination.

I have tried to break a new ground in the subject. Almost all the topics of general interest—Everyday Science, General Astronomy, Life Upon the Earth, the United Nations Organisation, Literature, World Events, Current Affairs and the like, as detailed in the table of contents, have been taken up. An effort has been made to include all that commonsense requires. The facts have been based on hundreds of standard works on different subjects. Much attention has been paid to keep up coherence and continuity of each topic within the scope of this book. It has all along been kept in view that the reader may not feel weary. In order to make it easy for general reader to understand, Urdu equivalents of English have been added where necessary, and where Urdu equivalents are not helpful, they have been explained as simply as possible. Technical words have been avoided. Discussions have been kept at a commonsense level. The idea has been to give a thorough grasp of the essentials. The details have been given quite briefly and due space has been assigned to various items. With a view to giving an intelligent outlook to the subject, a large number of examination questions selected from various competitive examinations have been added with brief solutions

at the end of most of the parts of this book. I hope the book will be of real help to those who make use of it.

Any suggestions for improvement of this book will be received with thanks. I shall be grateful if my readers bring to my notice errors or misprints that may have escaped scrutiny.

I am heartily grateful to—

K.B., Z. A. HASHMI,
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M. MUHAMMAD YAKUB KHAN,
Editor, *Civil and Military Gazette*, Lahore.

They devoted their precious time to go through the book and were kind enough to write Forewords for it. In the end, I must thank the Proprietors and workmen of the Rippon Printing Press, Lahore; Mr. S. D. Khwaja and Ch. Muhammad Hussain, Proof Readers for the care they have taken in the printing of this book.

T. M. DOGAR.

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INTRODUCTION

GENERAL KNOWLEDGE

Its Scope and Importance.—Nature lies around us with all her phenomena wide open. There are the earth, the blue sky, the sun, the moon, the stars, high mountains, deep seas, wide plains, vast deserts, green trees, animals, birds, and many more things. It is indeed a strange and fascinating world and most of us know little about it. We all enjoy learning strange and unusual facts. The best place to find them is Nature. Nature is not only stranger than fiction but there is also no end to the variety of strange facts to be learnt about the universe, the heavenly bodies, the earth, insects, animals, birds, plants, fish, spiders and geology. Light travels at a speed of about 1,86,000 miles per second and it takes some 8½ minutes to reach the earth from the sun. Travelling on beyond the confines of the solar system it takes about four light-years, corresponding to a distance of about twenty-five million years to reach the nearest known star. The distance of the star nearest to the earth, as at present known is 2,60,000 times the distance of the sun from the earth. The smallness of apparent size of the stars is due solely to their great distances. The sun's mass is 3,32,000 times that of our earth and its volume more than a million times. A train moving at 60 miles per hour day and night would take over five years to traverse its circumference.

Our curiosity and urge to study and understand Nature increases when we learn of a fish that fights its way upstream for one thousand miles without any food, of an ocean bird which lives on fish but cannot swim and would drown if it alights on water, of plants which live underwater at the very brink of the Niagra Falls, of a fish that cannot swim, of an animal that sleeps seven months each year, of a bird that travels 25 thousand miles every year to get more sunshine etc.

There are many curious things about man's achievements made in science. He can talk to persons from as far a distance as he may choose, can soar high above the clouds, can go deep into seas, can feel his way in the air during dark nights, can observe distant things as clearly as anything and

so on. The progress made by him in other fields: politics, economics, literature, war, peace, etc., presents a wide ground for study by a common man.

Knowledge is as vast as the universe itself. In its limited sense, it is applied to the perception of a thing; in its broader sense to the full understanding or comprehension of a thing. What a man knows of the world is known to him by the events in his own life, events which but for the power of thought would have remained merely a secret.

All the immensities of space and all the abysses of time are mirrored in his thoughts. Nothing is too great or too small for his intellect to compound, nothing is too distant in time or space for him to assign to it its due weight in the structure of its cosmos. In power he is nearly as feeble as his minuteness suggests, but in comprehension he is boundless, and the equal of all that he can understand.

The ordinary man, in order to equip himself to wage the battle of life successfully, must know something about what lies around him, about various branches of knowledge, for the same reason that the astronomer, even if his eyes are fixed at higher things, must know about bootes. The reason is that these matters affect his life. A general conception of things (common-sense) helps one in every walk of life—in the battle-field, at desks in offices, at business counters, etc. An all-round (general) knowledge of things develops originality and quickness of understanding and creates an alert and conscious mind.

It is rather unfortunate that the existing set-up of our education does not provide adequately for general knowledge. It is very often that graduates of our universities know little beyond their own subjects of study. As a matter of fact, our system of education was designed by our late rulers (the British), to manufacture clerks to carry on the routine work in Government offices. Accordingly, the basis of our education was merely rudimentary—nothing beyond what was absolutely necessary to give the British cheaper clerks in comparison to the white-skinned man who had to be "imported at a very high price." It will take time to bring the system of our education to the same level as that of other free nations of the world.

General Knowledge from Examination Point of View.—Governments require the best type of men for public services. Candidates are expected to know something of every branch of knowledge. "General Knowledge" has been prescribed as a compulsory paper in almost all competitive examinations which are held for recruitment to various branches of Government services: the C.S.P. and other Central Superior Services, Commissioned Ranks in Armed Forces, Provincial Civil Services, etc.

(*a*) (*i*) Type of General Knowledge Questions.

General Knowledge includes knowledge of current events and matters of everyday observation and experience in their scientific aspect as may be expected of an educated man who has not made a special study of any scientific subject. The questions in competitive examinations are designed to test the candidate's knowledge on these lines.

Although it is not possible to classify or satisfactorily define anything so general as "General Knowledge", yet it will be useful to arrange the greater part of it under suitable headings. The following suggestive headings will be found to cover a very wide field:

I. Current Events.—Wars, treaties, inventions, new books, great men of our own and other countries, political changes etc.

II. Everyday Science and Inventions.—Telephone, telegraph, aeroplane, radar, electricity, etc.

III. General Health.—Fundamental principles of health; topics relating to most common diseases, their treatment, precautions against diseases etc.

IV. Literature in general and particularly about the current language or national language, terms, authors, books, well-known quotations and other topics of general literary interest.

V. Constitutions of the world, politics and political terms.

VI. General Economics.—Fundamental principles, terms, general policies in so far as they relate to the national life.

VII. Geography.—Topics of general interest and natural phenomena, communications, crops, important cities, ports, capitals, lakes, seas etc.

VIII. History.—Events of common interest which do not require a special study of the subject.

IX. General Astronomy.—The sky, the stars, the sun, the moon, the earth etc.

X. Common Business Terms.—Discount, monopoly, patent, cheque, slumps, tariff, speculation, good-will, etc.

XI. Common Legal Terms and Legal Procedure.—Summons, habeas corpus, jury, nisi, forgery, warrants, etc.

XII. Abbreviations and Foreign Phrases of Everyday Use.

(*ii*) **General.**—The subject requires us to cultivate the most important habit of going through the natural and literary world with our eyes open. If we get hold of each fact, or make a note of it for future reference, we, like a student who utilises his odd moments, will not only gain pleasure and information but will also have, what is more valuable, an alert mind. It is, however, pointed out that even the most useful things and all the virtues when carried to excess may be curse instead of a blessing. Cramming of facts without understanding and beyond common need go a long way to poison our minds. As a matter of fact, we learn more of a "General Knowledge" from day-to-day observations and careful study of newspapers than through the study of books. The development of these habits is sure to enrich our minds with this type of knowledge which is useful in every aspect of our life.

(*b*) **Answering General Knowledge Questions.**

Answer as briefly and completely as possible. A question the answer to which is not known, should not be attempted. If you leave a question unattempted, the examiner learns that you do not know. But if you make a shot at it with its almost certain wrong answer, the examiner finds out something else you do not know, with the probable result of some more marks being lost.

Hazy Knowledge.—It is often observed that people have hazy knowledge about things. The small amount of knowledge they have is not only incomplete but is also inaccurate. It almost seems as if they pass their life looking "through a glass

darkly." The reason for this mental fog and the consequent hazy knowledge is undue haste which should be avoided.

It is of course impossible for a person to be an all-round expert. He has to be content with very incomplete knowledge of most things. But there is no reason why the part of the fragmentary knowledge he has, should not be clear or comparatively so. Our aim should be to *know everything about something and something about everything*.

Note Books.—It is not conveniently possible to search for the meaning of an unknown phrase or reference at the time it is met with. It should be taken down and referred to when reference books are available. It will pay you better in all ways to find these meanings for yourself because you will thereby get fuller and more accurate information. Very often it is convenient to discuss the difficulties with your friends and teachers.

Current Events.—Apart from examination purposes in General Knowledge, it is highly desirable that one should take interest in current events such as are recorded in newspapers. This helps him considerably when he appears before an Interview Board where he has to face the interviewers with (a number of) questions concerning events of the day.

TYPES OF EXAMINATIONS

Written, Oral and Practical.—The form of an examination depends on the purpose for which it is intended, the nature of the subject matter to be tested and the age and status of the examinee. A written examination determines, primarily, whether or not a candidate has remembered a specified body of knowledge or to ascertain how far can he organise and apply his knowledge.

In a way, written examinations are unlikely either to enable candidates to exhibit their knowledge and abilities in their entirety or to disclose all their deficiencies. An oral examination, conducted with skill, sometimes makes it possible for a candidate who has fared badly in a written examination to convince the examiners that he possesses ability and knowledge that his written answers did not make apparent. On the other hand, many a candidate, who has performed creditably

in a written examination had his inadequacies exposed by an oral examination. Oral examinations are also used to measure skills which cannot be assessed with written examinations. In examining a modern examination, for example, it is important to assess not only a person's ability to write and to translate the language but also his ability to use it in conversation.

Practical examinations bring out an individual's performance when he is confronted with a concrete task. A candidate may well be able to show in a written examination that he understands a subject or topic, for example, the principles of a radio transmission. A practical examination will tell whether he is also capable of locating faults in a receiver.

In some subjects, examinations may involve the use of written, oral and practical examinations. In the natural sciences, for example, all the three methods of examination are appropriate. The form of examination which suits most for a particular purpose can best be determined by empirical methods. The technique of follow-up study has been used to gauge the efficiency of a number of examinations by the recording of their results and by observations of the subsequent careers of the candidates.

Essay Type Examination is the most familiar kind of written examination. It consists of a relatively small number of questions to which, particularly from advanced students, answers of a fairly substantial length, written in the form of essays, are required. In assessing these the examiner inevitalby exercises a certain amount of subjective judgment. Answers of this kind cannot be assessed as wholly right or wrong. They are generally awarded marks according to the extent to which the examiner considers that the candidate has introduced all the relevant facts or arguments or a sufficient number of them. The candidate's ability to write with clarity and precision, or even with what the examiner regards as a pleasing style, may also affect the result.

In essay type examination application or explanation of facts or principles is required, as for example, "Describe the Western policies in the Middle East". "Describe the solar sytem." "Discuss foreign policy of Pakistan," etc. In case of essay type questions before writing an answer one should read

all the questions thoroughly deciding exactly what each calls for and what it does not call for. An attempt should be made to grasp the scope of each question and of the examination as a whole. Before writing any answer, it is very often much helpful if one could note, on a rough sheet, salient brief points which his reply should contain. It will go a long way in making a reply more clear and more complete. Irrelevant replies, besides wasting precious time, create adverse effect on the mind of the examiner. A candidate in Geography included an irrelevant story of a fish covering some four pages in his answer to a question which required a short note on Bombay port. The examiner was kind enough to grant two marks for his having used so much of ink and his precious time!

Clearness and Accuracy. In the writing of an examination one should try for accuracy and clearness. They pay much. Sometimes a casual bit of humour or an apt comparison or an occasional genuinely penetrating remarks can go in his favour. If in an answer to a question or questions one can be quite interesting and creates impressions on the examiner, he stands a good chance of securing the highest position. But it all requires great tact and relevancy.

Gross misspelling, badly deformed sentences and grammatical mistakes are likely to give the examiner a bad impression. A good and accurate expression is very essential in securing a high position.

Planning the Answer. It is very important to arrange the material to be included in your answer as also the time to be spent. If one does not organise his answer it will lead him to serious difficulties. He would not be able to emphasise important points. His verbose discussion will ramble all around the subject without making any part of it clear. Moreover, he will devote much of his time and space to one or two possibly unimportant details and will be compelled to omit or tackle insufficiently more essential points. A plenty of material jumbled up with a reply fails to get good marks.

General. It is no use trying to bluff an examiner. If one positively does not know the answer to a question it is wiser to admit his ignorance by omitting to answer it wrongly.

Irrelevant and lengthy introductions are useless. One should begin either with a topic sentence, summarising his main points or with one of the main points themselves. It prevents him from straying from the subject. It has the advantage of making clear the chief idea which his answer is to express.

In discussing controversial subjects it is necessary to show all sides of them. If authorities can be cited as relevant it is much paying.

Every examination is planned to a definite length of time. The candidate who utilises all or most of the allotted time is usually more successful than the one who dashes hurriedly through his paper and leaves the examination hall when most of the candidates are just reckoning time half way mark of the examination. The entire time should be utilised.

A candidate's answer to questions should reveal that he has adequate knowledge of the facts, the theories or whatever other information is required. It should also reveal that he sees the internal and external relationships of the various parts of the information he is presenting. His ability to separate relevant from irrelevant material should be apparent. It should show that he has the ability to present material in an orderly manner and that he can emphasise those parts which need emphasis.

Observing conventions of good composition, giving the answer a proper, tidy get-up with suitable margin, attractive handwriting, suitable headings and paragraphs, proper length of answers, attempting the required full number of questions, etc., all go to secure good results.

Criticisms. Essay type examinations are criticised as having a number of inadequacies and limitations in them. Critics maintain that the results of these examinations can be shown to be unreliable in that they depend to a large extent on the subjective judgment of the examiners. It has been demonstrated that the marks awarded, to the same papers by different examiners vary significantly, and that a given examiner, when invited to assess the same paper on two different occasions, is unlikely to award it the same marks. It can be shown that the performance of the candidates is also uneven. Examinations of this type contain only a small number of questions, representing a tiny fraction of the total number

that could be formulated to cover every aspect of the field of knowledge with which the paper is concerned.

"New Type" or Objective Examination.—Essay type examinations have been found less suitable for a number of purposes than examinations constructed on more scientific lines and known as "objective" tests, usually involving some combination of multiple choice problems. Such tests consist of a large number of questions thus sampling more effectively than essay examinations the areas of knowledge with which they are concerned, and these questions are devised so that they yield only one acceptable response. A marking key is usually provided by means of which any examiner can assess any script unambiguously, without having to rely on subjective judgment. Some of these tests are standardized through administration to large samples of individuals, and thus it is possible to relate the performance of one person to that of a large number of others of the same age and status.

"Objective" or "New Type" examination is a factual memory examination, composed of mere recall questions. Here an examinee's alertness of mind and recalling power are tested. A question may take a number of different forms. As for example, in asking the name of the capital of Turkey the question may take many forms, such as:—

(*i*) ——is the capital of Turkey (complete it).
(*ii*) Teheran is the capital of Turkey (say yes or no).
(*iii*) The capital of Turkey is: Istanbul, Beirut, Damascus, Ankara (tick off the correct answer).
(*iv*) What is the capital of Turkey?
(*v*) Fill in the blank:
  (*a*) An——is the capital of Turkey,
  (*b*) ——ra is the capital of Turkey, etc.

Different forms in which generally the New Type examination questions can be set are as follows:

(*a*) *Completion* ....is the President of the U.S.A.
(*b*) *Enumeration*. Name the members of the Pak. Cabinet.
(*c*) *Diagrammatic*. Draw a map of Pakistan.
(*d*) *Yes/No or True/False*. Quaid-i-Azam Mohammad Ali Jinnah was Prime Minister of Pakistan.

(*e*) *Multiple Choice.* By 'camouflage' is meant—

(1) A kind of uniform worn by commanders. (2) A disguise worn by soldiers at the front. (3) Strategic advance in war-times. (4) A deceptive colouring given to combatants or military equipment.

(*f*) *Sequence.* Number the following items in order of sequence:.............1950, fall of Hyderabad to India, death of Liaquat Ali Khan, 1956, integration of West Pakistan into One-Unit, Turko-Pakistan Pact.

(*g*) *Categorical Matching.* Match each item in column (A) to the item in column (B) to which it is related.

A	B
Country	*Capital*
Pakistan	Tokyo
France	London
Egypt	Paris
U.S.A.	Cairo
Britain	Washington
Japan	Islamabad

(*h*) *Analogy.* Knowledge is to judgment as possession is to: (1) use, (2) affirmation, (3) doubt, (4) dispossession.

(*i*) *Cross out.* Cross out that is incorrect: (1) Gold is the chief mineral of Pakistan. (2) Australasia is the greatest jute producing country. (3) U.S.A. is the richest country of the world.

There is a growing tendency in Civil and Military Competitive Examinations in General Knowledge that questions of the "New Type" are set. The number of questions is quite large, sometimes exceeding even one hundred. Answers are to be written or marked on the question papers themselves. Speed and accuracy are required to do well. Careful reading of questions is very essential. Overlooking of some important little word may alter the entire meaning of a question or statement. It pays to read carefully and completely the questions in an examination.

PART I

GENERAL ASTRONOMY

"But how can finite grasp the infinite?"—*Dryden.*

CHAPTER 1

THE MYSTERIOUS UNIVERSE

Astronomy is the science that deals with the origin, evolution, composition, distance and motion of all bodies and scattered matter in the universe.

All along there has been a mystery regarding the beginning of creation of the universe (*i.e.*, the world, the whole system of created things: *Jahan, Alam*). Science, theology and philosophy have had different conceptions about it. They fail to explain the universe beyond certain limits.

Perhaps, in the beginning, the universe was a limitless boiling ocean of thin vapour of matter. Some people believe that originally matter was uniformly distributed in space and from this matter were congealed out (changed from fluid to solid by cold) the heavenly bodies, perhaps in the beginning God said, 'Let there be light' and there was light. Some people think that originally space was flooded with "Light" which translated itself into Energy. According to this view, "Energy" lay motionless over a limitless space and for ages on end there was no indication of cosmos (*ka'inat*—the world as an orderly or systematic whole). Later on in the course of time, the energy took the shape of incandescent (*roshan*) vapours of matter distributed uniformly in space. Wherefrom this original energy came? Our science and philosophy have no reply to make. As a matter of fact, our conceptions are essentially contracted by our environment of definite space and definite time and we cannot go out of these to investigate what lies beyond their confines.

Formation of the Universe.—Presuming, therefore, that somehow or other all the substance of the present stars and nebulae (clusters of distant stars forming misty clouds) was, at first, spread out uniformly throughout the space, it is stated by Hubble that a force of attraction (called gravitation) was thrown between the particles (molecules, as they are technically called) of this unbounded ocean of the thin matter. Henceforth every particle of matter in space

could be held in equilibrium only by an exact balancing of the forces of attraction exerted between itself and its neighbours. And it became impossible for any particle disturbed from its original position to regain that state. Therefore, the vapour separated out in myriads of condensations which dotted all around the regions of space. Each of these condensations held together its particles from flying away by attractive gravitational forces exerted by its centre. As a result of the gravitational unstability, the condensations began whirling round in such a way that their motions generated forces which sustained and overcame the gravitational unstability and the component vapours of each individual condensation began rotating about a centre. That was essential for gravitational stability. The rotation in a mass of unsolidified matter also caused another change in the shape of condensation. It got flattened in an orange-like shape. As the rotation increased, the flattening also increased.

A further step in the building up of the universe now took place. As these condensations rotated they also underwent contraction, with corresponding increase in the speed. This rotation and contraction continued till at last the flattening process reached their height and gave rise to further split-up into smaller condensations; for example, the star, nebulae, etc., as we find them today. This is how Hubble has accounted for the development of the universe.

General Structure of the Universe.—The invention of telescopes has brought about a great change in the astronomical outlook of man. Something is now known about the structure of the universe. The sun is a star in the Milky-Way (*kehkashan*)—an assembly of some 300,000 million stars, abot 150,000 light-years across and between 25,000 and 40,000 light-years thick. "The total mass of the galaxy is about 160,000 million times the mass of the sun; the mass of the sun is about $2\times(10)^{27}$ tons. The whole of this system is rotating about its centre of gravity. The sun takes about 225 million years to complete its orbit round the Milky-Way.

In the space beyond the Milky-Way other systems of stars, of approximately the same size as the Milk-Way, are scattered at fairly regular intervals throughout the space that our telescopes can explore. The systems are called extra-

galactic nebulae. It is thought that about 30 million of them are visible. The average distance between two nebulae is about two million light-years.

The Universe is Finite.—Einstein's Theory of Relativity maintains that the universe is of finite size. It does not mean, however, that there is an edge to it beyond which there is something which is not included in the universe. The theory tells us that space itself is curved. The universe is a three-dimensional sphere (involving length, breadth and height) in which the straightest possible line returns in time to the starting point, as on the surface of the earth. The theory further considers that the universe is either contracting or expanding.

The Expansion of the Universe.—It has been observed that the extra-galactic systems are all receding from us with velocities which increase proportionally to their distances. Similarly, the distance of any nebula from any other nebula must also be increasing, at a rate proportional to their mutual distance. This is held to show that the universe is expanding. This may or may not be so. Possibly the universe may be oscillating between a certain maximum and a minimum limit with a finite period of oscillation. Astronomers are not definite about it. All that can definitely be said is that at present the universe is expanding.

The Age of the Universe.—When did the earth, the stars and the nebulae come into existence?

Basing on geology (*Ilm Tabaqat-ul-Arz*), the science relating to the history and development of earth's crust, together with the several floras and faunas (which have successively clothed and peopled its surface), the age of the earth is some 3,000 million years. But there still exists controversy over the age of the sun and other stars. They may be several million million years old or only a few thousand million years. Eddington used to maintain that the universe began in about 90,000 million B.C.

Conception of the Solar System.—*Sol* is the Latin word for 'sun'. The phrase *solar system* means the sun and the group of heavenly bodies held in captivity by the sun. These heavenly bodies include the nine known planets (of which the earth is one), their satellites (28 in number), a great number of asteroids, and some other bodies like comets, meteors and

meteorites whose whereabouts are still a mystery. All these bodies move round the sun in elliptical paths, being held in their orbits by the gravitational force of the sun and of one another.

For a clear conception of the scale of the solar system take the Sun as reduced to the size of a beach ball of 24 inches in diameter. On the same scale, roughly, the nine planets would be represented thus:

(1) Mercury =a grain of mustard seed 164 feet away.
(2) Venus =a pea 284 feet away.
(3) Earth =a pea 430 feet away.
(4) Moon =a grain of mustard seed 13 feet out from the earth.
(5) Mars =a currant 654 feet away.
(6) Jupiter =an orange half a mile away.
(7) Saturn =a tangerine $\frac{4}{5}$th mile away.
(8) Uranus =a plum just over a mile away.
(9) Neptune =a plum $2\frac{1}{2}$ miles away.
(10) Pluto =a pinhead usually about 3 miles away.

The utter remoteness of the solar system from all other heavenly bodies is stressed by the fact that, still using the same scale of a two-feet sun, which for this purpose we shall place in the centre of, say, London, the nearest stars, the triple Centauri system, would lie about 8,000 miles away, say in the region of London with the largest member having a two-feet diameter. Only the next three nearest stars in our Milky Way galaxy could, even on this scale, be accommodated on the earth's surface.

Man had been considering the moon and the planets among the "Fixed Stars". The Babylonians and the Egyptians could predict the lunar and solar eclipses with certainty. The heavenly bodies were considered to be gods. This common belief was questioned by Anaxagoras. He considered the sun to be a red-hot stone and that the moon was made of earth. He was persecuted and made to flee from Athens.

All the time people had been considering that the stars, the sun and the moon all moved round the earth. But towards the end of the fifth century B.C. it was discovered that the earth was a globe, a round body like a ball, a sphere. Some

hundred years ago, therefore, they measured the diameter of the earth. Then the astronomers began to measure the distance of the earth from the stars and the planets, and the magnitude of the sun and the solar system. People had many superstitions about the earth and heavenly bodies. They worshipped them. The names of days such as Sun day (Sunday), Moon day (Monday), etc., suggest that heavenly bodies, *e.g.*, the sun, the moon, etc., were worshipped in those days. People like Galileo had to suffer at the hands of ignorant and superstitious-minded people for long until the invention of telescope established the falsehood of most of the superstitions forming part of religion. Newton established beyond all doubt that all the planets move round the sun. He introduced the public to the laws of gravitation. As regards the origin of the solar system, Newton held that the hand of God hurled away the planets which began to move in their orbit under the influence of the laws of gravitation.

The Origin of the Solar System.—There are different stories regarding the origin of the solar system.

(*i*) *Theory of Laplace.*—Laplace supposed the solar system to have originated out of a flattened mass of gas or nebula extending beyond the present orbit of Neptune, which was, at the outset, at a high temperature and in rotation. The mass gradually cooled down by radiation at its surface and at the same time contracted under the influence of its own gravitation. Consequently, the central portion was heated and the angular velocity of rotation was increased. As the angular velocity increased, the centrifugal (*i.e.*, tending away from the centre (*baeed az markaz*) force at the equator), at last became greater than gravity. Laplace supposed that a ring of matter was left behind along the equator and that further contraction detached a series of such rings. Each ring was supposed to break up and condense into a gaseous planet which again underwent a similar process of evolution on a smaller scale. It resulted in the formation of satellites. This theory presupposes that all the planets were formerly gaseous. The objections to the theories of Laplace are numerous and strong, *e.g.*, the matter left behind during the contraction would not form a ring, even if the rings were produced, they could not condense into planets, etc.

(*ii*) *The Planetesimal Theory* developed by Chamberlain and Moulton supr ses an initial non-rotating gaseous

mass which, under the influence of its gravitation, would be spherical in shape. If another body passes sufficiently near this mass, tidal forces are produced. As they approach more closely, their tides will rise in height until, according to the theory, two jets of matter will rush out from the centre to directly opposite points, where the tides are highest. And as the tide-raising body passes on, it will set the primary body in rotation. The two jets of nebulous (misty, hazy, having the appearance of little clouds) matter are, therefore, ejected from a slowly rotaing body and the ejected body will take the form of two spiral (*pechdar*) arms. This theory appears to be reasonable in so far as the explanation of the typical spiral form is concerned.

(*iii*) The third theory is known as the *Theory of Jeans* The tidal Theory of Jeans offers the most plausible explanation of the remarkable system of the planets (*sayyare*) and comets (*dumdar sitare*) which owe allegiance to the sun. The theory supposes that in the remote past the sun was approached by a larger and more massive star. This star came close enough to exert a great gravitational attraction upon the sun's gaseous and liquid material, upon which huge tides were raised, and a portion being torn from the sun broke up into drops which condensed to the liquid and solid worlds we know. Thereafter the sun's gravitational attraction held them balanced in space and caused them to travel round it in elliptical orbits (*baizawi halqa*). Jeans has shown mathematically that the masses of the planets are just what would be expected from a parent of the size of the sun; and that their relative bulks, forming a cigar shape if jointed up—ranging from small to large and down to small again are the natural results of such an origin. He has also shown that the orbits of all the newly-born offspring must have been very elliptical at first, just like those of the comets but that frictions, due to much interfering spray, would tend to cause the orbits to become more circular. Probably, a catastrophe, such as gives rise to the solar system, must be a comparatively rare occurrence in the universe, and it had been estimated by astronomers that ours took place some 3,000—5,000 million years ago.

There are many more theories put forward to account for the origin of the solar system but they do not appear to be quite plausible.

CHAPTER 2

THE STARS

We look at the heaven and see twinkling, glittering little points of light, known as stars. The ancients called them "fixed stars" because they apparently do not alter their position with respect to one another, in contrast to the wandering stars or planets. The smallness of their apparent size is due solely to their great distances. The distance of the nearest star at present known is 260,000 times the distance of the sun from the earth. Mr. Halley first proved that the bright stars, Sirius, Procyon and Arcturus were gradually changing their position with reference to the neighbouring stars. The apparent relative displacements are so small, even in the course of centuries, that the appearance of the constellation of light stars does not appreciably alter in the course of thousands of years.

The stars were divided by the ancients into groups or constellations (groups of stars) to which were given names of persons or objects famous in ancient mythology. This was done for the convenience of their location in the sky.

Number of Stars.—The number of stars in the whole sky down to a given limit of magnitude can be determined with sufficient accuracy by selecting a large number of sample areas, distributed over the sky in a uniform manner. Seares and Van Rhijn estimated that the total number of stars was about 30 thousand million—a finite number—and the number down to a magnitude limit of 28 million is about half of total. This number, although very uncertain, suffices to give a general indication of the magnitude of the number.

Double Stars.—Many stars, which appear single to the naked eye, are found, when examined in a telescope, to be double. They may appear double for two causes: (*i*) The two stars may be at very different distances but nearly at the same line of sight, in which case there is no physical connection between them. Such pairs are termed

as optical doubles. (*ii*) They may be at the same distance and physically connected, revolving about their common centre of gravity under the action of their mutual attraction. Such pairs are termed binary system and are of interest to astronomers.

Variable Stars.—Variable stars are of great interest and importance. They are so called because their light varies. The number of known variable stars is several thousands and is being added to continually. Some of these stars vary irregularly while others are quite regular in variation. The periods of the light variations range from a few hours to several hundred days.

There are some types of variable stars. One type which is particularly interesting is the cephoid variables. They are intrinsically very bright stars, but they are so far away that they do not appear very bright to the naked eye. They each vary regularly in brightness over a period of six days. The important thing about this kind of stars is that there is a fairly exact relation between the brightness and the rate of variation. Cephoids are found in all parts of the sky. If their period of variation is known it is an easy matter to calculate their distance.

"New" Stars, Novae or Temporary Stars.—The name is applied to a star which experiences a sudden and usually considerable increase in brightness after which its light diminishes, at first somewhat rapidly, and then more slowly, but usually with small and irregular oscillations to a more or less steady value. The majority of novae, before they outburst, were faint stars generally showing small fluctuations in brightness. The normal nova appears to undergo only one outburst. No typical nova has been known to have a second outburst, though the possibility of previous outburst, having occurred in the past some centuries earlier, cannot be excluded.

We do not know for certain the physical causes which produce the outburst. But there is little doubt that these originate within the star itself. The phenomenon suggests that instability sets in and that in the comparatively rapid transition to a new equilibrium state, there is a large amount of energy released. The increased radiation pressure causes the rapid expansion of the outer layers of the star which are

finally thrown off from the star. Milne suggested that the nova stage is an unstable stage, which every star must pass through at a certain stage of its evolution. The star begins suddenly to collapse ; a large quantity of gravitational energy is released, which causes the outward expansion of the surface layer of the star. According to this theory the final stage of a nova is a white, dwarf star.

The Milky-Way or Galaxy.—(*Kehkashan*) is the name given to the luminous belt of stars which encircles the heavens, nearly in a great circle. The great circle of the galaxy crosses the celestial equator at an angle of about 62 degrees. Its diameter from edge to edge is computed between 200,000—300,000 light-years. The Galactic Plane is the plane of the great circle passing as nearly as possible through the centre of this belt. Both the width and the brightness of the Milky-Way vary greatly from one point to another. The Milky-Way is composed of a great number of faint stars which are not individually visible to the naked eye. It is an irregular structure and consists of numerous groups of stars called star-clouds. The brightest region containing the densest constellation of stars is in the southern sky. The star-clouds are all very remote, some of them are at distances as great as 30,000 light-years; other star-clouds which are hidden from view by nearer clouds are at presumably still more distant. The average brightness of the Milky-Way is about twice that of the remaining portion of the sky. On account of the presence of faint permanent aurora and to the zodiacal light, the sky on a moonless night is not dark. If the sources of general illumination were absent, the Milky-Way would appear much brighter.

It has been established that the galaxy is slowly rotating The time of one complete rotation, in the neighbourhood of the sun, is calculated to be about 225 million years.

Other Galaxies.—The Milky-Way is merely one of many other galaxies. They are often termed as spiral nebulae, because, when seen broadside-on, these galaxies show a typical, spiral structure. The Great Nebula is Andromeda. It is visible to the naked eye as a faint, diffuse patch of light. It contains numerous star-clouds, bright nebulae. Like our Milky-Way, it is slowly rotating

The distance of the Great Nebula in Andromeda was found to be 7,53,000 light-years, *i.e.*, it is far outside our galaxy.

Sirius.—It is the brightest fixed star. As a matter of fact fixed stars are (strictly speaking) not fixed. They are far away from us. Their motion is unappreciable.

Polaris or Pole Star.—There is a bright star very near the north-celestial pole. This star is known as "Polaris" or Pole Star.

Light Year.—Stellar distances are very great, and they cannot be expressed except awkwardly, in miles. The unit employed of the speed of light: 1,86,000 miles per second. An object is one light-year distant, when it takes a year for its light to reach the earth. Accordingly, one light-year is about 5.87 million million miles. Light takes about 8½ minutes to reach the earth from the sun. Travelling on beyond the confines of the solar system, it would take about four years, corresponding to a distance of about twenty-five million million years to reach the nearest known star.

Stellar Constitution and Evolution.—Direct observation deals only with the outer portion of a star, and this is a very small fraction of the whole. With the help of direct observation we may determine the size of a star, its mass, its luminosity or total output of radiation (*shua-raizy*). To proceed from these data, to derive information about the interior of a star, it is necessary to apply mathematical principles to the general physical properties of the matter of which the stars are made. The interiors of the stars are so hot that no chemical compounds can exist there. They are broken up into their constituent atoms, and the atoms in turn are almost completely ionized: in other words, all but the innermost electrons are stripped off from the atoms. Though this is the case, the atom nuclei retain their identity. The mean molecular weight increases towards the surface as the temperature and the ionization decreases. It has been seen that in the cooler stars simple compounds can exist in the surface layers.

A star is held together by its own gravitation. Opposed to this are the pressure of the gaseous matter and the pressure of radiation. The pressure of the gas tends to disperse the material of the star in all directions outwards. The radiation

in the interior of a star consists largely of waves of extremely short wave-length; the radiation is being continually emitted by some atoms and absorbed by others which in turn emit it again.

The Luminosity of a Star.—At any point inside the star there is an outward flow of heat. The heat is carried partly by conduction and partly by radiation. At the high temperatures the heat carried by conduction is negligible. The outward passage of the radiation is impeded by the capacity of the gaseous material of the star. The luminosity of a star is determined by the radiation passing through the surface of the star.

CHAPTER 3

THE SUN

The sun is a star—the nearest to the earth—and one of average size and characteristic. Its supreme importance to us is due to its comparative nearness, for the light from the nearest of the fixed stars takes about 4½ years to reach us, while that of our luminary (*i.e.*, the sun) takes only some eight minutes. The sun is the central body of the solar system, of which our earth is a member, and its immensely superior mass controls the motions of planets and small bodies which revolve round it.

Constitution.—The sun is a self-luminous body. The material composition of the sun has been discovered by studying its light; and it has been found that it is largely composed of metals and other heavy elements in gaseous state.

The sun is mainly a mass of intensely hot gas, the interior of which is compressed to a density greater than that of water, owing to the enormous gravitational attraction between its parts. Its temperature is enormously high and varies from millions of degrees centigrade in the interior to some thousands at the exterior.

Dimensions. The earth continuously travels round the sun in an elliptical orbit, and takes a year to complete the journey, our average distance from it is about 93 million miles and, as already stated, its light takes about eight minutes to reach us, travelling at 1,86,000 miles per second. The sun's bulk is enormous; its mass is 3,32,000 times that of the earth and its volume more than a million times, its diameter is 8,64,000 miles. A train moving at 60 miles per hour day and night would take over five years to traverse its circumference.

From observation of sun-spot movements it has been gathered that the sun is rotating on its axis within a period of 15 days at its equator, to nearly 27 in higher latitudes. This variation shows that the outer regions of the sun

which we see are fluid. The sun does not keep a fixed position in the heavens. Astronomical observations and investigations show that it is travelling through space at an enormous speed, carrying its family of planets with it.

Solar Radiation and Temperature.—The sun is continually radiating energy into space. Only a small part of this energy is intercepted by the earth and planets, the remainder passes away into space. A large part of the portion of energy that falls on the earth is absorbed by the earth's atmosphere. The temperature of the sun's surface is stated to be about 6,000°C. The temperature at the centre of the sun is stated to be in the neighbourhood of twenty million degrees. Our earth receives only one part in 2,200 million of the energy radiated by the sun, yet it amounts to an average of five million H. P. per square mile of surface.

Sun's Atomic Energy.—We depend on atomic energy for our food, for clothing and shelter and for comfort. As a matter of fact, all that we are and all that we owe, we owe to the sun's atomic energy which the sun sends to the earth day by day.

Botanists do not know just how the leaves of plants using soil, air and water prepare and store in their leaves, stems and roots the food needed by human beings and animals, but they do know that the sun must shine on the plants for this work to go on. If there were no light of the sun as well as its heat there would be no plant life and, therefore, no food.

What is true of grains, vegetables and fruits, is equally true for meat and dairy products. There must be sunshine to provide grass, hay and grain, the food for cattle, sheep and goats. These animals are really turning the products of sunshine, or atomic energy, into meat, milk, butter and cheese. Thus, all our food is due to the sun's atomic energy. Plants are the factories; sunlight the power; and soil, water and air are the raw materials.

Apart from feeding, sunlight clothes us. Cotton grows only where there are at least eight months of warm sunny weather. The same grass that provides meat and dairy products gives us wool and leather. Mulberry leaves grown in the sunshine give us silk.

Even the material of our homes can be traced to the same source. Timber comes from trees which cannot grow without the light and warmth of the sun. The paint and paper on the walls, the rugs on the floors and nearly all parts of our furniture are traceable back to the same origin as our food and clothing. Besides all these, the light and heat in our homes which make our surroundings comfortable and cheerful come from the same heavenly body.

Coal is a product of the sunshine of ages past. Millions of years ago plants grew luxuriantly in the great swamps of what is called the carboniferous age. The sunshine then did for the plants of that time what it does for the plants of today. Those plants were compressed to form coal which has been stored in the rocks of the earth for our use today. Coal is thus only the bottle sunshine of ages past.

Electricity, although directly derived from water, indirectly it is the product of sunshine, which evaporates water to form into clouds, to rain, lastly to flow in rivers which produce hydro-electric power.

We derive energy to move about, to travel, to do work, from the sun. The energy of our muscles has come to us indirectly from the sun. If we walk, our power is from the sun. If we ride an automobile, our power is from the same source. Petroleum from which gasoline is obtained comes from rocks which, like coal, were formed millions of years ago. The sun's heat causes winds to blow. Air heated by the sun is lighter than cold air and is pushed onward by the cold; thus wind is produced. A sailing vessel is propelled by the sunlight of its own day (wind), but a vessel which uses coal or oil is using stored sunshine. It is the atomic energy of past ages which does nearly all our works. With its power we travel by land and by sea. It carries our goods from one corner to another. Aeroplanes fly over the land; submarines dip beneath the seas. Unfortunately much of the destruction of warfare is done by the aeroplane and the submarine. Man would be much wiser if he saved the great forces which nature has stored up in the past and put them to uses which would make all mankind prosperous and happy.

The Light of the Sun.—Generally, it is regarded that the light of the sun is yellow. It is, however, much whiter than

the light from ordinary artificial sources of light. The light of the sun is nearly half a million times that of the full moon. Each square centimetre of the sun's surface shines with a light equal to about 50,000 candle power.

Maintenance of the Sun's Heat.—The sun radiates enormous energy in the form of heat and light. It has been radiating this enormous energy for the past thousands of million years, but it is still the seat of terrific energy and there has been no appreciable decrease in the internal store of heat of the sun.

In case the stellar magnitude of the sun were to decrease by half a magnitude equivalent to a decrease in the sun's brightness to two-thirds of its present value, a universal ice-age of the earth would result. On the other hand, the energy also does not increase, for, if it were to increase by one magnitude, the temperature of the earth would rise to the boiling point. It is probable that, in either case, life would cease to exist on the earth. As a matter of fact, the sun has been maintaining heat, although not absolutely regularly, because geological evidence has indicated that there have been alternations of warm periods and ice-ages in the past history of the earth. The variations have, fortunately, been small in amount. By what process this is achieved, has been a matter of controversy.

Surface.—Photographs of the sun taken through the telescope show many peculiarities and irregularities on its surface. Its structure is not uniform, but appears to be speckled and granulated (broken into grains or small masses), changing rapidly at different times and places. This is probably because of movements of gaseous layers of varying luminosity. Although the sun looks like a flat disc to the naked eye, the photograph proves its globular nature by a darkening haziness around the edge, and by the fore-shortening of sun-spots as they approach the edge of the disc. The bright surface covering the sun is called the *Photosphere*.

Sun-spots.—The most remarkable feature of the solar surface is the presence of a number of dark patches called sun-spots. They are seen through a telescope with coloured glass. A sun-spot is funnel-shaped vortex (*bhanwar*—a whirling motion of a fluid forming a cavity in the centre: a

whirl-pool in the outer regions of the sun). With this vortex, gaseous matter streams spirally upwards and outwards. As the matter streams out of the funnel-shaped mouth, it expands rapidly. The expansion produces a considerable cooling. The emitted gases flow more or less radially outwards from the spot along the surface. They vary greatly both in size and duration. Some of them disappear in the course of a few days, others survive for one or two revolutions of the sun. They very rarely last more than a few months. Large spots may be more than 100,000 miles in diameter. They can be seen by a naked eye when the sun is viewed through a darkened glass. The spots are not fixed in respect to the surface of the sun, but drift relatively to the surface. The drift may occur in any direction but is usually greater in longitude than in latitude. The actual drift may amount to several thousand miles in the course of a day.

It has been found that the sun-spots occur in cycles. Their activity is waxing or waning in a period of eleven to twelve years, when they are once again at their maximum or minimum. It has been claimed that their activity has a definite effect on earth's magnetism. When sun-spots are numerous, magnetic storms (disturbances in the magnetism of the earth or air which cause the magnet needle to move rapidly backward and forward when telegraph and telephone circuits are likely to be interfered with) are relatively frequent; when sun-spots are few in number, the storms are rare. All the same, the presence of sun-spots is not the necessary and only condition of a magnetic storm. There are other factors as well.

Solar Eclipse.—A solar eclipse occurs when the moon comes directly between the earth and the sun and the moon's shadow touches the earth. Solar eclipse occurs only at a new moon. It does not take place every month, because the orbit of the moon is inclined at an angle of about 5 degrees to the ecliptic.

How it occurs; Our earth revolves round the sun and the moon revolves round the earth. Every 29.5396 days the moon comes in between the earth and the sun. The moon then obstructs the sunlight and casts its conical shadow. This shadow may or may not touch our earth. Whenever and wherever this shadow touches the earth solar eclipse occurs.

Why solar eclipse does not occur every month? As a matter of fact there are three conditions for occurrence of a solar eclipse: (1) the moon should be between the sun and the earth. Roughly speaking, it occurs a day or two before new moon appears. (2) The sun, the moon and the earth should lie in a straight line. This happens twice during a lunar month at model pontus. All the three do not always lie in a straight line. In that case shadow of the moon does not fall on the earth. (3) The distance between the moon and the sun keeps on changing and, therefore, also the length of the moon's shadow. (4) The distance between the moon and the earth also changes. As such at times the shadow of the moon may be too short to reach the earth. In such a case annual eclipse takes place. The central portion of the sun is eclipsed and the remaining portion visible.

Total solar eclipse occurs on a day when the sun, the moon and the earth lie in a straight line and the length of the moon's shadow is greatest and the distance between the moon and the earth is smallest. The circumstances which are responsible for a solar eclipse repeat themselves after an approximate period of 18 years and 10⅓ days.

A Solar Eclipse Observations.—At 6-7 p.m. on June 30th 1954 the moon came in between the sun and the earth.

There was a sudden increase in the wind velocity. When the eclipse was over and the sun recovered, the high winds suddenly dropped down to their usual 8-miles-an-hour velocity.

Observers in the open—experts as well as amateur sky-gazers—said they felt tiredness and fatigue. The scientists explained: the moon had cut off solar energy giving infrared and ultra-violet rays.

The birds, the animals and plants, it was proved, started behaving rather in an unusual manner. The birds were seen flying haphazardly.

An interesting phenomenon was the improvement in wireless reception. The atmospheric disturbances died down completely and the reception was as perfect as it could be. (It is the sun-spots and the solar radiation that cause disturbances). At places where the eclipse was almost complete the stars appeared over the sky. In the sun the temperature

dropped considerably, but the temperature in the shade remained practically unchanged.

After the eclipse, the wind rose high and everything else started returning to normal. The tiredness and drowsiness of those who felt it was also gone. And on the radio the disturbances started again as usual.

The like of the eclipse will not be seen throughout the world for another 197 years. Partial eclipses occur from time to time at various places.

A total solar eclipse is of a very short duration ranging between a few seconds and a few minutes only. At one place a total solar eclipse may not take place for centuries.

At the time (which is accurately predicted) when solar eclipse occurs the moon starts to sweep across the sun. Whatever light comes to us at this time, it comes from the edge of the sun and it is of a different quality. Strange colours appear. The temperature falls and birds and animals feel perplexed.

CHAPTER 4

THE EARTH

Origin. Our earth was one of the bodies which separated away from the vapoury filament (a slender thread-like body) drawn out from the sun by the gravitational pull of an unknown star. Probably it occurred some two or three thousand million years ago. This is gathered from geological consideration. As the time passed, the vapoury mass of our earth cooled into liquid (fluid—*behne wali chiz*). The liquefaction was facilitated by the vastly smaller size of its mass as compared to that of the sun. It is not certain how long it took to liquefy. The next stage was solidification of this liquid mass. Further cooling, encrustation, buckling and scrapping went on. At last, the surface of the earth formed an irregular appearance of hollows and hills. There was no eye to see these initial stages of the formation of our planet. The whole process might have taken thousands of years. "A momentous smoking desert, cindery underfoot with no more scenery than sand-dunes. Here and there, out of a crack, comes a crawl of molten rock like very coarse-grained tar, hardening and blistering on its surface as it cools and creeping out in from beneath its crust in an ugly sort of way. No sun by day, nor moon by night, nor any stars, but a thick curtain of cloud over everything and hiding the heavens. And beneath the cloud a dense and dusty, unbreathable air with carbon dioxide gas, and water vapour and much nitrogen, but only a trace of oxygen."

The Size and Shape of the Earth. To our eyes, it appears that the earth is flat, but, actually, that is not the case. It is spherical in shape, that is, not a flat plain, but a curved surface. It has been found that the earth can be represented with sufficient accuracy for most purposes as an oblate spheroid, *i.e.*, a figure formed by the revolution of an ellipse about its shorter axis. The earth is flattened at the poles, the diameter along the axis being shorter than a diameter in the equatorial place. The diameter of our globe has been

computed to be 8,000 miles (approximately) along the equatorial plane and about seventeen miles less along the line of the poles.

Recent Discoveries. The orbit of an artificial satellite vehicle is determined by the gravitational pull of the earth together with the effect of air resistance. As the latter effect may be separated out, it is possible from precise observations, to obtain information about the earth's gravitation. This in turn depends on the shape of the earth, which may therefore be studied in a new and effective way.

More detailed information has become available about the shape of the earth from precise observations of the orbits of the first satellites. This is because the force exerted by the earth on a satellite depends on the figure of the earth. Although it has been known for a long time that the earth is not exactly spherical, but is flattened at the poles, satellite studies have shown that the amount of flattening is not exactly that was previously presumed. It is usually given in terms of the ratio, (a-c)/a, of the difference between equatorial and polar radii to the equatorial radius. The value of this ratio was taken to be 1/297.1, but analysis of the data obtained from satellite orbit observation shows that it should be 1/298.24.

It has been found that the earth is slightly pear-shaped, with the stalk towards the north pole. The scale of this effect is such that the south pole is 50 feet nearer the centre of the earth than the north pole.

A determination of the ellipticity of the equator has also been made.

Additionally, much more precise information can be obtained of map distances by simultaneous observations from three or more ground stations of the position of a satellite. In order to make such observations practicable, the satellite *Anna* B was launched by the Americans at the end of 1962. The satellite was equipped with a discharge lamp which give light flashes of short duration but very high intensity.

The Interior of the Earth. It is not possible to penetrate very deep into the earth. Our knowledge of its interior is gathered by indirect methods. The temperature of the earth increases rapidly from the crust inwards. Hot springs and volcanoes testify to this fact. All the same, there is no direct

evidence as to the continuous gradual rise in temperature at great depths. It is believed that the earth has liquid core with a diameter of more than 4,000 miles. The core (the inner part) is, probably, mainly metallic. The crust (the hard rind or outside coating of anything) outside this core is composed of heavy basic rocks.

The Rotation of the Earth. To the ancients, the earth was the centre of the universe. They believed that it was fixed and everything else—the sun, the moon, the planets and the stars—moved round it. It was not until the sixteenth century A.D. that Copernicus (1473-1543), a Polish-German astronomer, told the world that the earth and other planets revolve round the sun. For fear of punishment, perhaps torture to death, he did not disclose his discovery to anybody except his friends. The first printed pages of his great work were put into his hands as he lay uying. He could feel them but could not see what he had written. He died the same day. Bruno tried to propagate this fact, but was burnt to death in punishment.

The earth rotates round its own axis, once in a day. This fact causes the succession of days and nights on the surface of the earth. It also revolves round the sun in an orbit which is more or less elliptical. The change in seasons occurs on this account.

Seasons. The path of the earth around the sun, although elliptical, is not far removed from a circle, and consequently the cold of winter and the warmth of summer as experienced in the temperature zones, are not due to the earth being farther from the sun in winter than in summer. The explanation is to be found in the fact that the amount of heat received by a surface from source of radiant heat depends on the inclination of the surface. As the axis about which the earth rotates is not perpendicular to the plane in which it revolves around the sun, at one portion of the earth's orbit, and six months by an atmosphere which is a mixture chiefly of nitrogen and later it is tilted (slanted) away from the sun.

The Earth's Atmosphere. The earth is surrounded by an atmosphere which is a mixture chiefly of nitrogen and oxygen. Water vapour is present at the surface to the extent of 1.2 per cent of the total. At great heights, the lighter gases predominate.

The sky is blue. It is so because the earth possesses an atmosphere. When light passes through a medium containing numerous small particles, a part of it is scattered side-ways on account of these particles. The shorter the wave-length of the light, the greater will be the scattering. The blue light is, therefore, scattered to a much greater extent than the red light. The light, as it travels, is then gradually robbed of its blue proportion and appears red. The molecules of the atmosphere scatter the blue light towards us and produce the blue appearance of the sky. The more free the air is from the comparatively larger dust particles, the purer and deeper will be the blue light.

The golden tints of sunset are also due to the same cause. When the sun is nearer the horizon, the light from it, which reaches an observer, passes through a much greater length of atmosphere than when it is higher in the heavens. A greater portion of blue light is lost. Therefore, the light that reaches the observer is tinted red. The beautiful colours, which frequently accompany the setting of the sun, are mainly due to dust particles, and depend very largely upon the amount of dust in the atmosphere.

Atmospheric Structure. The pressure, density, temperature and wind distribution in the atmosphere up to altitudes of 100 km. or so was investigated at white sands, New Mexico, at Fort-Churchill, Canada at Woomera, Australia, and at several locations in the Soviet Union, using vertical sounding rockets.

Pressure and density were measured using pressure gauges located at suitable places on the shell of the rocket. Soviet investigators made direct temperature measurements using resistance thermometers, but in other countries the temperature distribution was obtained indirectly by deriving the speed of sound as a function of height. This was done by a sound ranging method in which grenades were ejected at regular intervals from a rocket, to explode at a distance of 50 ft. or so from its trajectory. The grenade explosions are located in space by photography or radio and in time by recording the times of arrival of the light from each flash at photo-electric detectors on the ground. Finally the times of arrival of the sound pulses from each explosion are recorded by an array of

microphones. From this information it is possible to derive not only the mean speed of sound through the atmosphere between successive grenade explosions but also the mean east-west and north sound wind speeds.

The grenade method in this form cannot be expanded above 80 km. because of the weakness of the sound signal from greater heights. From 100-150 km. explosion of a grenade produces a glow through reaction with atmospheric atomic oxygen. This lasts for 20 minutes or so. From observations of the rate of growth of the glowing region the air density may be obtained and from the changes in shape the wind speeds may also be derived. The grenade glow may be replaced by a fluorescing cloud of sodium vapour, the sodium having been ejected during twilight from a rocket.

Results obtained have confirmed the general nature of the variation of temperature with height which had been deduced from ground-based or balloon assisted studies. Evidence of small diurnal and seasonal effects has been obtained.

Direct measurements above 50 km. are much fewer in number but above 200 km. a great deal of information is available from analysis of satellite orbit data.

Air resistance causes the period of revolution of a satellite to decrease gradually at a rate which depends on the air density at the perigee (the closest point of approach to the earth's surface). If the dimensions of a satellite are known it is possible to derive the air density from the observed rate of change of period at any time.

So many results have been obtained in this way that the Committee on Space Research (C.O.S.P.A.R.) prepare tables of mean atmospheric pressure, density and temperature out to altitudes of 800 km. where the density is about 4×10^{-14} of that at ground and the temperature is about 1,400°K.

As the altitude increases the air density becomes more and more variable. The atmosphere above 300 km. bulges in the direction of the sun, and contracts gradually throughout the polar cycle from the disturbance maximum to the minimum. It is also strongly sensitive to solar disturbances.

The Future of Life on the Earth. The sun is radiating energy and heat into space and thus losing its mass day by day. Possibly the energy-supply from the sun may discontinue after a period of few million years. At last, this may cause uninhabitable conditions on the earth. The fact that life has an enormous capacity to adapt itself to the changing environments, cannot help in the long run. The shrinkage of mass may cause a reduction of its radiation to a tiny fraction of its present amount, transforming our oceans into ice and our atmosphere into liquid air. Consequently, there will be no life on the earth in its present form. Moreover, as the sun decreases in weight by loss of its matter, its gravitational attraction is proportionately diminishing. Therefore, on account of this decrease in gravitational pull, our planet, like others, is slowly moving away from the sun. This slow recession from the sun may, at some stage, cause collision of the earth with any other body in the universe. Beyond the normal course of events, the possibility of variety of "accidents"—as Sir James Jeans terms them—cannot be ruled out. The sun may run into another star; any of the stars in space may wander into the solar system and upset the movement of planets to a fatal extent; any asteroid (a minor planet revolving between the orbits of Mars and Jupiter) may hit any other asteroid. Although it is believed that the likelihood of such accidents is extremely small, still such a possibility cannot be altogether ruled out.

It is observed that some "new" stars (nova, as they are technically called) burst out suddenly into a terrible brilliance and either fade away or continue to shine as ordinary stars. Almost all the stars are in danger of bursting into "new" stars. The sun is also a star. It has been calculated that the sun is likely to become a nova in the next million years. This sudden bursting up of the sun into a nova will emit tremendous heat and light which will scorch all life on the earth.

In the normal course of events, *i.e.*, if no "accident" happens, our earth may survive for thousands of millions of years. Sir James Jeans states: "Looked at in terms of space, the message of astronomy is at best one of melancholy, grandeur and oppressive sadness. Looked at in terms of time, it becomes one of the almost endless possibility and

hope. As inhabitants of the universe, we may be living near its end rather than its beginning; for it seems likely that most of the universe had melted into radiation before we appeared on the scene. But, as inhabitants of the earth, we are living at the beginning of time. We have come into being in the fresh glory of the dawn, and a day of almost unthinkable length stretches before us with unimaginable opportunities for accomplishment. . . . We seem to discern that the main message of astronomy is one of hope to the race and of responsibility to the individual—of responsibility, because we are drawing plans and laying foundations for a longer future than we can well imagine."

CHAPTER 5

THE MOON

The moon is to us one of the most important of the heavenly bodies. Her tide-raising force is of great importance to mankind. Her silvery light is always welcome at night.

Origin. It is generally accepted by astronomers that the moon and the earth were formerly one body which had probably been thrown off from the central body of the solar system. The appearance of the moon was caused by the attraction of the sun on the earth when it entered a danger zone during the course of her irregular movements. The entire mass had, at the time, a high temperature and was in a fluid condition, and rotated rapidly about an axis. Gradually, it cooled and contracted with a corresponding increase in its rate of rotation. It is also held, although not so convincingly, that moon and the earth were originally separate bodies.

Surface Structure. The important features on the surface of the moon are revealed by a small telescope. But for minor details better instruments are necessary. Our naked eye sees the figure of "man in the moon." The giant telescopes show that it is a series of high mountains and craters, much like the rugged physical features of our own planet. With the magnification of telescope, the moon is in effect brought to a distance of about 240 miles from the earth. Thus, we can see quite clearly the objects on her surface. On only one side of the moon, which can be seen, there are lofty mountain ranges, cracks, rills, craters, etc. The most numerous objects to be seen on the moon are the so-called craters, mountainous ring formations which are to be found all over the visible surface. The rills are narrow, deep valleys, usually not straight. They differ from the cracks and clefts which are perfectly straight and may run for hundreds of miles through mountains and valleys. The craters are said to have a volcanic origin.

Physical Conditions on the Moon. The moon has no atmosphere encircling its globe. It is known with certainty that the moon is a dead world. It is also certain that there is no water on the moon. There is little or no appearance of erosion or weathering on the lunar mountains or craters and there are no clouds to be seen at any time. Although competent observers have occasionally seen patches of a greenish hue which have been thought to show signs of change during the course of the lunar month and have been conjecturally interpreted as vegetation, the existence of any vegetation is very improbable because there is no atmosphere or water for the existence of any vegetation.

The second Russian lunar probe, which succeeded in hitting the moon, contained a magnetometer to observe any lunar magnetism. This operated to within 50 miles of the surface, but recorded no magnetic field, suggesting that the moon cannot have any appreciable magnetism. Supporting evidence is provided by the failure to observe any zones of intense particle radiation around the moon due to trapping by a lunar magnetic field.

The third Russian lunar probe passed behind the moon and took photograph of that part of the lunar surface which is never visible from the earth. These photographs were automatically processed and scanned for transmission by radio signal, on command from the earth, at the next point of closest approach of the vehicle to the earth. From these data the picture was reconstructed on the earth, showing for the first time some of the hidden features of the moon.

Phases of the Moon. The most striking feature of the moon is its changing phases, its waxing and waning or the variation of its visible outline. It waxes from the position of new moon through crescent shape to new moon, after a full lunar month. The explanation of these phases is very simple. The moon has no inherent brightness of its own. But owing to the high reflecting power of its surface, it is able to reflect back some of the light from the sun which falls upon it. It is by means of the light reflected from that portion of the surface which is illuminated by the sun that the moon becomes visible to us. As it journeys round the earth, presenting the same face to us at all times, we see different amounts of her illuminated surface on different days.

The moon, like other members of the solar system, possesses two movements of rotation and revolution. The fact that we always observe her on the same surface, establishes that the periods of rotation and revolution are equal, *i.e.*, on the lunar surface a month is of one day.

The Tides. At the seaside, it is noticed that the level stretch of sand or rock at the foot of the cliffs is now covered by the sea and now left bare. The tide comes in and goes out twice every day. Every month there is great tide which occurs on the night of full moon. It is mainly due to the attraction exerted by the moon on the waters of the ocean that the tides are caused. As the attraction of the moon on the water (a fluid) is greater than its attraction on the earth (a solid), water is heaped up at the point directly under the moon. The water level on the other side of the globe falls down at the same time. The sun has also an attraction on both the water and the land. But being far away it has no appreciable effect. It is the tides which reduce great rocks to fragments and keep the ocean water moving. They are also of enormous economic importance to mankind. Water can be stored in upraised tanks and allowed to run down in hydro-electic plants and turn the wheels of huge generators.

Lunar Eclipse. When earth comes directly between the sun and the moon, the moon becomes invisible, because the shadow of the earth falls on the moon, and the light of the sun is not allowed to fall on the moon. A partial lunar eclipse occurs when shadow of the earth falls partially on the moon. The eclipse does not happen every month, because the orbit of the moon is inclined at an angle of about 5 degrees to the ecliptic. Lunar eclipse takes place only at the time of full moon.

Eclipses of the sun and the moon are possible only when the sun is near one of the nodes of the moon's orbit. In an interval of 6,585 days and eight hours, *i.e.*, 18 years 10 or 11 days, the sun and the moon return to approximately the same position with respect to one of the nodes of the moon's surface. This period is called the *saros*. The total number of eclipses in one saros is about 70, of which number 41 are usually solar and 29 lunar. Of the solar eclipses 14 are partial, 17 annular

and 10 total. Working on the saros basis, one can predict number of eclipses.

The Age of the Moon. It is held that the moon has not always been where it is now. In the distant past it was very close to the earth. George Darwin (son of the biologist Charles Darwin) established that the moon is constantly receding from the earth at the rate of about 5 inches every year. In view of the fact that tidal waves running around and around our globe encounter resistance in the form of continents that stand in their way, and the body of the earth rotates inside the two tidal bugles, much as the axle of a wheel rotates between two brake shoes, we should expect that the rotation of the earth would be slowed down gradually. This would cause a gradual increase in the length of our day. According to a fundamental law of mechanics, known as the law of conservation of angular momentum, this lengthening of the day must result in lengthening of the rotation period of the moon (month) and in a gradual increase in its distance from the earth. Dividing the present distance to the moon (239,000 miles) by the estimate rate of recession (5 inches per year) we find that the moon must have been practically in contact with the earth about four billion years ago. One surprising result of these calculations is that, at that time, the length of a month (moon's orbital period) was equal to the length of a day (earth's diurnal period), both being equal to 7 present-day hours.

Facts about the Moon. The following are the facts about the moon:

Distance from Earth	
	Miles.
Greatest	252,710
Least	221,463
Mean	238,857
Diameter	2,160
Volume	1/81 that of earth
Mass	1/81 that of earth
Density	3/5 that of earth
Velocity of escape	1.5 m.p. s.
Temperature Noon plus 250F	
Night—215F	

Period of revolution around the earth 37 days, 7 hours.
Period of axial rotation 43 minutes and 11.5 seconds.

Average velocity of moon around earth is 2,287 m.p.h. or 3.350 feet per second. (In one hour the moon moves a distance about equal to its own diameter).

Full moon gives about 1/465,000 as much light as the sun.

Light of full moon is about 1/4 as bright as that of a standard candle at a distance of one yard.

The geography of the moon is called selenography. Over 3,000 craters are visible. These include:

Walled plains—diameter 60,150 miles; floor not much lower than outside.

Rugged plains—diameter 10-60 miles: uniform and circular; floor usually much lower than outside.

True craters—diameter 18 miles to less than 1 mile; deep and cone-shaped; deepest is Newton's Crater with rim 23,800 feet above interior.

Highest mountain is about 5 miles above average surface level.

Rays—bright streaks 5-10 miles wide and up to 1,500 miles long.

Rills—narrow crevices 10—300 miles long and less than 2 miles wide.

Seas—14 recognised large, smooth, dark areas. Cover about half of visible area, predominate in the North.

CHAPTER 6

THE PLANETS

A planet (*sayyara*, wanderer) is one of the bodies in the solar system which revolve in elliptic orbits round the sun. The planets do not have light of their own but shine by reflecting the light which they receive from the sun. The difference between a planet and a star is that a planet moves round the sun and has no light or heat of its own, whereas a star is a body like our own sun, and retains its relative position on the celestial sphere with such accuracy that refined observations are necessary to detect its motion.

The planets known so far are nine in number. They fall into three distinct groups. The first group contains four planets—Mercury, Venus, Earth and Mars. They are comparatively smaller and nearest to the sun. They are known as terrestrial group. Beyond them, with increasing distances from the sun, are the four major planets—Jupiter, Saturn, Uranus and Neptune. They are all at great distances from the sun and each of them is much larger than any of the terrestrial planets. Mercury, Venus, Mars, Jupiter and Saturn were known to the ancient astronomers who observed them with naked eye. Uranus was discovered by Sir William Herschel in 1781 with a 6½ inch reflector of 7 feet focus of his own make. The discovery of Neptune in 1846 by Leverrier ranks among the greatest achievements of mathematical astronomy.

Pluto, representing the third group was discovered in January, 1930 by astronomical photographs taken by the staff of the Lowell Observatory.

The orbits of Mercury and Venus lie within that of the earth and for this reason they are also called the inferior planets and the others superior planets. Both Mercury and Venus have phases like that of the moon and can be seen through a telescope.

Seen through a telescope, the Saturn is a most magnificent and impressive object with three layers of rings. A ring is not a solid whole but most probably it is a constitution of myriads of small satellites of various sizes each following its own orbit about Saturn but so small that at the earth's distance the individual constituents cannot be seen.

The Mariner II was guided so as to pass the planet Venus at a dstance of almost 20,000 miles carried equipment to scan the planetary disc in microwave and infra-red radiation as well as to measure the planetary magnetic field if at all appreciable. The microwave measurements showed a limb-darkening effect (darkening towards the edge of the disc) which excluded the possibility that the high microwave emission temperature must reach about 600°K. From the absence of a signal in the magnetometers it is concluded that the magnetic field of Venus is less than one-tenth as strong as that of the earth.

Asteroids or Minor Planets. They are a numerous group of very small planets (planetoids) circulating in the space between Mars and Jupiter. They are thousands in number and are extremely small. The larger of them has a diameter of only 480 miles. Only four asteroids have diameters of more than 100 miles.

As regardsthe origin of asteroids, they are said to be the relics of a larger planet which broke up. Another suggestion is that the matter forming the asteroids was originally distributed uniformly in a ring about the sun, like the rings of Saturn and that perturbations by the planet Jupiter broke it up into many fragments. Ultimately these fragments formed into what we call asteroids. But it cannot be said how far these theories are correct.

Satellites (small planets revolving round other planets which control their motions) are the so-called secondary planets. They are small members of the solar system attendant on the larger planets, by which their motions are controlled. They revolve around the sun. The moon is a satellite.

Life on Planets. The possibility of life on Mercury, Jupiter and other far off planets can be easily ruled out. Venus and Mars are favourably situated, have atmosphere, habitable summer and winter, moderate duration of years, days and nights, and gradual change of temperature, which

are the prerequisites for life. The surface of Venus is enveloped by thick clouds. It is difficult to find out the details.

In 1877, Schiaparelli announced the existence of five lines over the orange-coloured surface of Mars and, in 1881, he further announced that the lines first appeared single and then double. He named them 'canali' which means channel and which has been translated "canals". This led to the close observation of the planets and many observers claim to have seen the marking. Some deny the existence of the network of the five straight lines. The surface of the Mars has many details which annot be seen individually, but which the eye unconsciously integrates into lines and spots. Small telescopes would bring out fine network of details, which is generally destroyed in large telescopes having greater resolving powers.

The argument for the existence of life rests mainly on the straightness of the lines which is rare in nature and implies artificiality and work of high intellect and intelligence. Water is scarce on Mars and intelligent beings with engineering skill seem to have devised high projects for the supply of water. But the argument still rests on very insecure ground.

The existence of vegetation is definite and the possibility of life cannot be ruled out.

TABLE OF PLANETS

Planet	Millions of miles from the Sun	Mean diameter (miles)	Revolves round the sun in: Sidereal period (approximate)	Revolves round the sun in: Synodic period (years)	Synodic period (days)	Number of Moons	Mass compared with Earth	Remarks
Mercury ...	35.96	3,009	88 days	...	116	...	0.04	It is nearest to the sun and is rarely seen with naked eye. Temperature on its surface is high enough to melt lead. The opposite surface is believed to be exceedingly cold. Life, as we know it on our earth, is not possible on this Planet.
Venus ...	67.20	7,575	225 ,,	1	219	...	0.81	The brightest of all the planets and the most magnificent object next to the moon, seen in the evening skies, the first to appear in the evening twilight, while it is often to last to fade away before the onrush of morning light.
Earth ...	92.90	7,918	365 ,,	...		1	1.00	Already stated in detail.
Mars ...	141.54	4,216	687 ,,	2	49	2	0.108	It exhibits well-known markings which are thought to be canals on the surface. It is the most famous of the planets on account of speculations of life there.
Jupiter ...	483.31	86,728	12 years	1	34	9	316.94	The largest body in the solar system next to the sun. It is reddish-yellow in appearance. A detailed study of its nature is not possible owing to its changes and gaseous nature.
Saturn ...	886.12	71,500	29 ,,	1	13	9	94.92	Famous because of its "ring system" consisting of two bright rings. The rings probably consist of fine particles of solid matter revolving round the planet.
Uranus ...	1,782.70	30,875	84 ,,	1	4	4	14.58	Discovered in 1781; previously mistaken for a star.
Neptune ...	2,793.40	34,7C0	165 ,,	1	2	1	16.93	It was also mistaken for a fixed star. Neptune is very important in the history of Astronomy by reason of the fact that its presence was deduced mathematically before it had been observed.
Pluto ...	3,680	6,000	?		?	7	Smaller	Discovered in 1930, not much is known about its details.

CHAPTER 7

COMETS AND METEORS

Comets (*dumdar sitare*). Comets or Stellae cometae, *i.e.*, "hairy stars", as they were formerly called, are bodies which, moving under the influence of the sun's gravitation, appear in the heavens at irregular intervals. A comet, as it draws near the sun on its approach, moves more and more rapidly. Its temperature rises. The pressure of the sun's radiation drives the small dust out from the head—the bright head of a comet is not a solid body but it is a loose collection of rocks, stones and particles of dust—producing the luminous tails pointing away from the sun. The tail is gaseous. The length of the tail of naked-eye comet may be few million miles only, or in some cases may exceed the distance of the sun from the earth, with a volume some thousands of times that of the sun.

Most of the comets are members of the solar system. About one-fourth of the recorded comets are known to revolve round the sun in elongated orbits and most of them are believed to do likewise. A few may possibly be transient visitors to the solar system. The great majority of comets are periodic, *i.e.*, they return at regular intervals which may vary from 3½ years to hundreds or thousands of years.

The investigation of the orbits of the short-period comets revealed their relationship to some planets, especially Jupiter. Such comets are said to form a family group and the existence of such a group is based on "Capture" theory.

Halley's Comet, which appeared in 1910, moves in an elongated ellipse and returns in about 76 years. Halley, working on the laws of gravitation as enunciated by Newton, worked out the paths of many comets and calculated the orbit and periodic time of this comet which is now named after him.

Meteors or Shooting Stars. Closely connected with comets are meteors or shooting stars. Meteors are small

bodies which exist in great numbers in the solar system and probably arise from the breaking up of comets by the attraction of the sun or some large planet. Shooting stars may be seen on any clear moonless night, though on some nights they are much more frequent than on others. The brightness of the majority noted is approximately equal to that of the naked-eye stars.

The brighter ones leave trains which may persist as long as two or three minutes. Occasionally very bright meteors are observed, which from their appearance, are called fire-balls. The luminosity of a meteor is due to the heating produced by friction from its rapid motion through the earth's atmosphere. The energy of motion of the meteor is communicated to the molecules of air which it hits and a cap of heated air is formed in front of the meteor; this communicates heat to the surface layers of meteor itself which become vaporised. Thus an envelope of heated air and vaporised material forms about the meteorite and trail behind it; the luminosity of the meteors arises mainly from this incandescent vapour and persists till the meteor has been completely vaporised.

It is observed that the mean height at which they are observed is 80 miles and that at which they disappear is 50 miles. Many of the meteors have velocities greater than 60 miles per second. The large meteors or fire-balls first become visible at greater heights, up to 100 miles and penetrate more deeply into the earth's atmosphere, sometimes to a height of only 5 or 10 miles. The velocity decreases rapidly during their flight on account of the resistance of the earth's atmosphere to motion. The flight of a fire-ball is accompanied by a succession of explosions by which fragment are torn off from the principal body. The number of shooting stars which may be observed is very large. It has been computed that the total daily number of meteors which enter the earth's atmosphere cannot be fewer than several millions. Very few of these ever reach the earth's surface, the large majority being burnt up by the heat generated by friction in the earth's atmosphere before they reach the surface.

Aerolites or Meteorites. Such meteors as reach the surface of the earth are generally called aerolites or meteorites

(meteoric stars). They are, probably, essentially the same as the normal meteors or shooting stars, the distinction being one of size only. The majority of aerolites which are found or are observed to fall, consist of masses of stone, limestone, magnesia or siliceous stone, generally mixed with grains or globules of iron. A small percentage consists of nearly pure iron, usually alloyed with a relatively small amount of nickel. Some contain iron and stone in nearly equal proportions. No chemical element has been found amongst them which is not known on the earth. The mass of an aerolite may vary from a few ounces to several tons. The entering of meteors into the earth's atmosphere is continually adding to its mass but the rate of growth is, relatively, exceedingly slow, because the addition as compared to the mass of the earth is negligible.

Meteor Showers. The remarkable shower of meteor was seen by European observers on October 9, 1933. It lasted for four hours, and the rate of fall was counted to be 5,700 in 30 minutes. They belong to the Leonid Meteors family. The swarm of meteors moving in an orbit of about 33 years is seen to radiate from the points in the constellation of Leo about the middle of November. The swarm of 1933 belonged to the same family which was observed in 1833 and then in 1866 and subsequently in 1900 and 1901.

Meteors and the Weather. There may be a possibility that meteors affect the world's rainfall. The formation of raindrops in the lower atmosphere is, in part at least, a process of condensation on small nuclei such as minute dust particles. Fine meteoric material, whether as debris from the usual range of meteor sizes, or as micrometeorite dust, will drift slowly down from meteoric heights to the weather region in about a month. Some statistical evidence has been presented to show a connection between rainfall and meteor showers occurring a month earlier. Although the research is intriguing, the data are extremely difficult to analyse.

Meteors and Radio Communications. Normally, no communication can be established between a low-powered radio transmitter, using a frequency in the range 30-100 mc/sec., and a receiver several hundred miles distant, because the earth's curvature cuts off the direct wave, and the sky wave penetrates the ionosphere and is lost. However, whenever

a suitably orientated meteor trail appears in the upper atmosphere, roughly halfway between the stations, the radio wave may be reflected to the receiver as long as the trail endures, which may be for a fraction of a second or for several seconds.

In a practical communication system there is a transmitter and a receiver at each end of the link, with one or both transmitters emitted unmodulated carrier waves. The message to be transmitted is stored cn high-speed tape which can be started and stopped quickly. When a meteor reflection occurs, and the carrier wave is received at either end, the tape is started and the intelligence is transmitted just as long as the trail lasts. Despite the inermittent nature of the operation, this meteor system has several unique features which have led to its adoption as a useful member of the family of point-to-point communication systems. High-power ionospheric scatter systems also depend on meteor trails to a great extent. In this case, it is the myriad of small meteors that assist in maintaining a weak but continuous signal between the stations.

Meteors and Space Travel. Collisions with meteoric particles will be among the many hazards to face the space traveller. The kinetic energy released by a small high-speed meteoroid of iron or stone, if it were to strike a large body like a space ship, could be such as a thousand times greater than the explosive energy of an equal weight of TNT. A pinhead particle might blast a hole in the shell of the vehicle that would allow the air within to escape in a few seconds. A meteoric pellet the size of a grape would almost certainly destroy the ship. Fortunately for the astronaut the possibility of serious damage is very small. He should be able to travel for days before having to patch minor leaks in the ship's shell, while many years might elapse before a catastrophic collision took place. His chances for survival will be enhanced by steering clear of cometary orbits end the asteroidal belt between Mars and Jupiter.

EXAMINATION QUESTIONS

WITH BRIEF SOLUTIONS

1. *What is the difference between a planet and a star?*

A star shines or gives out light because it is white hot. A planet is a cold body; and gives only reflected light received from the sun. The planets are members of the solar system. Their motions are mainly governed by the attraction of the sun. If you look through a telescope, their surfaces appear as discs. The stars, on the other hand, are outside the solar system. The nearest star is farther away than the farthest planet. Owing to their being far away, all the stars, even to the most powerful telescope, appear nothing but points of light. The sun is a star, quite a small one, and must be excluded from these statements.

2. *Why does the moon give light at night? Is the moon bigger than the sun?*

The moon is not a luminous body. It simply reflects the sun's light. At night we see this reflected light, but as the day dawns we see this light less clearly, and as the day gets bright we cannot see the moon. The direct rays from the sun outside the rays that are reflected from the moon, light th moon. Actually the moon is very much smaller than the sun. It appears larger because it is considerably nearer to us.

3. *If an enormous explosion takes place on the moon about how long will it take to be heard on the earth?*

It will never be heard on the earth. Sound does not travel through empty space. As such, it cannot reach the atmosphere surrounding the earth.

4. *Why do leap years have 366 days?*

The earth journey round the sun takes about $365\frac{1}{4}$ days. Every fourth year, one day more is added to February. This, approximately, balances matters, although not quite exactly.

5. *What is (a) Stratosphere, (b) the Bathysphere?*

The stratosphere is the upper portion of the atmosphere above a height of some seven miles. There the temperature changes but little with altitude. The bathysphere is a hollow steel diving sphere with glass windows used by William Beebe for observing marine life under natural conditions.

6. *Who was the first man to measure the circumference of the earth accurately?*

Eratosthenes, in the third century B.C., came within about 200 miles of the measurement now accepted.

7. *How do you account for a halo round the moon?*

A halo round the moon on a clear night is due to the refraction of light by small ice-crystals in the air.

8. *Which is older, the earth or the moon?*

The earth is older than the moon. The moon was separated from the earth. It is believed that the scar where the moon was torn off is now the Pacific Ocean.

9. *Assuming that the atmosphere is free from heavy clouds how is it that the stars cannot be seen during day-time, while they can be seen under similar conditions from the bottom of fairly deep vertical shaft of a coal-mine?*

The light of the stars is too feeble to be seen in the face of the too bright diffused light of the sun pervading the atmosphere during day-time. Therefore, we cannot see stars during daylight. Stars can be seen only when the light of the sun is eliminated. At night time the light of the sun vanishes and the light of the stars can reach us.

While looking at the sky from the bottom of a deep vertical shaft of a coal-mine, similar conditions are brought about. As blackness absorbs all light falling on it and does not reflect any portion of it back, the diffused light of the sun gets absorbed by the back walls of the shaft and none of it reaches the observer at the bottom. On the other hand the light of the stars vertically above the shaft goes directly down the sun through the air without anywhere touching the walls. Thus the stars become visible from the bottom of a shaft.

10. *How hot is the sun?*

It is said that the surface temperature is some eleven thousand degrees Fahrenheit. No substance can exist in the solid or in the liquid state within one lakh miles of it. The inside of the sun is said to be still more hot, even up to eighty million degrees Fahrenheit. It is held that the heat can burn our earth to smoke and ash instantaneously.

11. *How many times is the sun bigger than the earth?*

About 13,000,000 times.

12. *Why does the sun rise and set?*

The earth rotates round its axis once in a day. The portion of elliptic surface of the earth that faces the sun, enjoys what we call day-light and the portion that is away from the sun has the shades of night. To us, it appears that the sun rises and sets, although actually it is the earth that rotates round its own axis in front of the sun.

13. *Why is a winter day in Pakistan shorter than a summer day?*

The earth moves round the sun in more or less elliptical orbit. It completes the rotation in one year. The earth also moves simultaneously round its own axis once in a day. The axis about which the earth rotates is not perpendicular to the plane in which it moves round the sun, but it is inclined at an angle of sixty-six-and-a-half degrees. The northern hemisphere, in which Pakistan lies, is a little away from the sun in winter and the sun is shorter above the horizon than in summer. In summer days the northern hemisphere is inclined towards the sun and the sun is longer above the horizon than in winter. That is to say, winter days in Pakistan are shorter than summer days.

14. *How fast does the earth rotate?*

The earth does not rotate at the poles. At the equator it rotates with a speed of about one thousand and thirty miles per hour. At other places the speed varies uniformly between the above limits.

15. *If the sun suddenly ceases to send out light to the earth, how long will it take for the change to be noticed on the earth?*

8½ minutes.

16. (*a*) *What are constellations?* (*b*) *Name important constellations* (*c*) *What is Aurora?*

(*a*) Groups of stars which are concentrated here and there in space forming some imaginary figures are termed constellations. In the north there is a group of seven stass popularly recognised by most of the people. This famous constellation has got three names, *viz.*, Great Bear, Plough or Ursa Major.

(*b*) The list of most important constellations is given below:—

(*i*) Great Bear, Plough or Ursa Major.

(*ii*) Cassiopia (broken W-shaped).

(*iii*) Cephius (inverted temple-shaped).

(*iv*) Leo (lion-shaped).

(*v*) Scorpio (scorpion-shaped).

(*vi*) Orion ('man with gun'-shaped).

(*c*) Aurora is a luminous meteoric phenomenon of electrical character seen in and towards the polar regions, with a tremedous motion and giving forth streams of light.

Aurora Borealis or *Septentrionalis* are the nothern aurora or northern lights and *Aurora Australis* are the southern lights.

17. *What are the kinds of year?*

The year is of three kinds.

(*a*) *Tropical year.* It is the period of sun's revolution in the ecliptic from Vernal Equinox to Vernal Equinox back.

(*b*) *Sidereal year.* It is the period of a complete revolution of the sun in the ecliptic relative to any fixed star free from proper motion.

(*c*) *Anomalistic year.* It is the period of the Sun's complete revolution in its elliptic orbit around the earth (apparently) from Perigee to Perigee back or from Apogee to Apogee back.

18. *State briefly:*

What do you understand by (a) Solar day, (b) Sidereal time, (c) Sidereal day?

(*a*) The interval between two successive transits of the centre of the Sun over the meridian of an observer or an observatory is called an apparent Solar day.

(*b*) The hour angle of the true Vernal Equinox at any instant at any place is called the apparent (or true) Sidereal time at that place. The hour angle of the mean Vernal Equinox at any instant is called the mean sidereal at that instant.

(*c*) An apparent Sidereal day is the interval between two consecutive transits of a star over the meridian of an observer or of an observatory.

19. (*a*) *With which scientist should you associate the explanation given during the sixteenth century that the apparent movement of celestial bodies is best explained by the revolution of the earth and planets round the sun with the stellar universe outside this system?*

(*b*) *What is zodiac?*

(*a*) Copernicus.

(*b*) Zodiac is the belt of firmament enclosing the circuit over which the principal planets travel. It is divided into 12 equal spaces of 30 degrees each, comprising respectively, the twelve signs of the Zodiac *viz*., Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius and Pisces.

20. *Give a list of various calendars that have been in use.*

Calendar is the mode of adjusting the natural divisions of time with respect to each other for the purpose of civil life. An almanac is table of months, days, and seasons, or of special facts etc.

Counting of time by days, months and seasons began very early in man's history.

(*i*) The *Greeks* dated everything from the beginning of the Olympic register. It was a traditional list of victors in the Olympic Games. It started in the years 776 B.C.

(*ii*) The *Romans* counted time from the founding of their city in 753 B.C.

(*iii*) The *Hebrew Calendar* dates back to 3760 years and three months before the beginning of the Christian era.

(*iv*) *The Christian Era.* Christian nations throughout the world date events from the birth of Christ.

(*v*) *Buddhist Calendar* is reckoned from the death of Buddha in 543 B.C. (actual date being 487 B.C.). The Buddhist year starts from Vaisakhi Purnima.

(*vi*) *Hindu Calendar* employs luni-solar cycles made by the combination of solar years and lunar years so treated as to keep the beginning of the lunar year near to that of the solar year. The *solar year* is divided into twelve months according to the successive entrances of the sun into the sidereal signs of the Zodiac. The *lunar year* consists of twelve lunar months. It is of two kinds according as it begins with certain day in *Chaitra* or with the corresponding day in *Kartika.*

(*vii*) *Islamic Calendar* dates from the Hijra of the Prophet Muhammad from Mecca to Medina in 622 A.D. The Hijri era is purely lunar. It consists of 12 months each month being of 30 or 29 days. The mean length of Hijra year is 354 days, 8 hours and 48 minutes and the period of mean lunation is 29 days, 12 hours and 44 minutes.

(*viii*) *Julian Calendar* was started by Julius Caesar in 46 B.C. The object of this Calendar was to adjust the extreme errors which had crept into the civil year.

The beginning of the year was changed from March 1 to January 1.

(*ix*) **Jewish Calendar** is a luno-solar calendar. The year is solar while months are lunar. In a cycle

of 19 years the I, II, IV, V, VII, IX X, XII, XIII XV, XVI and XVIII years have twelve months. The remaining years have 13 months of 29 or 30 days each. The length of the ordinary years may be 353, 354 or 355 days and that of the leap year 383, 384 or 385 days. The mean length of the year over a 19 years cycle is just over 365 days. The years are reckoned from 3760 to B.C. Thus the year 1963 A.D. is *A.M.* (Anna Mundi) 5723. The day begins at sunset.

(*x*) **Gregorian Modern Calendar :** was introduced in 1582 A.D. It was based on the Julian Calendar. The Julian Calendar was modified by Pope Gregory XIII. The idea was to adjust the calendar to the tropical year, because Julian Calendar had left 11 minutes and 14 seconds resulting in an error of 10 days since its adoption. Each year is of 365 days with every fourth year as a "Leap year" of 366 days. The Julian Calendar reckoned the length of a year as 365¼ days, whereas it is actually of 365.2422 days.

(*xi*) **The International Fixed** Calendar League has placed a calendar of 13 months each of 28 days and a New Year Day which comes between December 28, the last day of a year and January 1, the beginning of the next. The thirteenth month Sol comes between June and July. In a leap year a day is inserted between June and Sol. The main advantage of this scheme is that the same date always falls on the same day of the week.

(*xii*) **Indian National Calendar** was adopted for official purposes along with the Gregorian Calendar from zero hour on March 22, 1957. This calendar is based on the 'Saka' era which began with the Vernal Equinox of 78 A.D. corresponding to 1878-79 of the Saka era. The year consists of 365 days except that a leap year contains an extra day. The new year seeks to prevent mistake occurring

in fixing the length of the year or the month. Seven months are of 30 days each and five months are of 31 days each. In a leap year six months are of 30 days each and the rest are of 31 days each.

(*xiii*) **World Calendar.** The proposed World Calendar requires that the year should be divided into 4 quarters, each containing 13 weeks of 91 days or 3 months, commencing on Sunday and ending on Saturday. The months of January, April, July and October will contain 31 days each and the remaining 8 months 30 days each. 365 days (extra Saturday) will be named as World Day and may be considered as world holiday.

21. *State briefly what is meant by space research.*

By space research we mean scientific research work which can only be carried out by means of equipment carried to otherwise inaccessible observing locations by rocket propulsion. Such propulsion does not place reliance on the presence of an atmosphere to provide oxygen so that it is capable in principle of conveying objects to unlimited distances. Thus the subject of space research is concerned with scientific applications in various fields of a single highly specialised and powerful technique. It can provide data of great importance such as the physics of the earth, the sun, moon and other bodies of the solar system, astronomy, geodesy, and the study of gravitation. The prospect of investigating the biological conditions on different planets such as Mars and Venus is also opened, as well as that of experimental biological studies under conditions of zero gravity. Although the results of many aspects of space research are vital for those concerned with the practical realisation of manned travel in space, space research is largely a branch of pure science independent of any applications which may stem from it.

22. *What is the data that space research has furnished in respect of the earth's upper atmosphere?*

Before the introduction of space rockets the greatest altitude attainable by balloons was about 20 miles. Much of great scientific interest remained to be investigated at greater altitudes.

It has been discovered that near the 60-mile level a number of important atmospheric phenomena occur. Above this level the oxygen becomes predominantly monatomic in contrast to the normal diatomic form at lower altitudes. The ionosphere, a region in which concentrations of free electrically charged particles—electrons and positive ions—occur in sufficient concentrations to affect substantially the propagation of radio waves through the region. extends upwards from a height of 60 miles to several hundred miles. It is most concentrated at an altitude over 200 miles. Meteors are mainly burnt up near the 60-mile level though very small micrometeorites—fine dust less than 10^{-3} mm. diameter—do not heat up sufficiently through atmospheric friction to evaporate, and gradually settle on the surface.

The bright atmospheric glows which are observed in the sky near polar latitudes—the northern aurora borealis and the southern aurora australis—are most frequently observed at altitudes near 60 miles but do not extend at times to such higher altitudes. There exists also a much weaker glow—the night air glow—which does not depend strongly on geographical location.

The behaviour of the upper atmosphere is strongly influenced by the sun. The electro-magnetic radiation emitted continually by the sun is responsible, through its effect on atmospheric atoms and molecules, for the production of the ozone layer, the dislocation of diatomic to produce monatomic oxygen, the ionosphere, and the air-glow. When in a disturbed state the sun emits streams of electrically charged particles which produce the auroral displays and a number of associated effects, which include disturbances of the compass needle which when great enough are known as magnetic storms, and disturbances of the ionosphere, particularly in polar latitudes. The marked concentration of the effect near polar latitudes is due to the influence of the earth's magnetic field on the streams of charged particles which produce the phenomena.

23. *What types of heavenly body are the sun, earth and moon?*

Name the following:

(*a*) *The largest,* (*b*) *the smallest, and* (*c*) *the brightest planet in the solar system.*

24. (*a*) *Distinguish between sidereal day and solar day.* (*b*) *What do you understand by constellation?*

25. *How do you distinguish between a planet and a star?*

26. *Rearrange the items of column A so that each one is on the same line with the word or expression in B that is most closely related to it :—*

Column A	*Column B*
(*a*) Mars	largest planet.
(*b*) Neptune	a satellite.
(*c*) Venus	eighth in distance from the sun.
(*d*) Earth	most distant planet.
(*e*) Saturn	orbits between Mars and Jupiter
(*f*) Jupiter	nearest the sun.
(*g*) Asteroids	shows 'canals' and white polar. caps.
(*h*) Moon	size most like earth.
(*i*) Pluto	average period of rotation 24 hours.
(*j*) Mercury	rings around equatorial region.

27. *What types of heavenly body are the sun, the earth and the moon?*

28. *Name the following:*

(*a*) The largest, (*b*) the smallest, and (*c*) the brightest planet in the solar system.

29. *Does the moon shine by its own light ?*

30. *When is the moon said to be waning ?*

31. *Describe modern conception of how the universe is constituted. Are the solar systems common ?*

32. *What is a light-year ?*

33. *What are shooting stars ?*

34. *Discuss the evolution of our solar system in the light of the nebular hypothesis.*

35. *Where are days and nights equal throughout the year and why ?*

36. *What is the difference between a star and a planet ?*

37. *Which is (a) the planet nearest to the sun. (b) What is the Milky-Way ?*

38. *Distinguish between the following :—*

(a) Nebulae, (b) the stars (c) the planets, (d) asteroids, (e) comets.

39. *(a) Which is the greatest of the planets ?*

(b) Which planet is nearest to the earth ?

40. *What argument can you adduce in favour of or against the existence of human life on (a) the Mars, (b) the Jupiter.*

41. *Discuss the possibilities of life on any of the following planets.*

(a) The Mercury, (b) the Venus, (c) the Mars, (d) the Jupiter (e) the Neptune.

42. *What is a comet ?*

43. *What is the source of the sun's heat and light ?*

44. *Show that all forms of transportation depend upon solar energy.*

45. *"We depend upon solar energy for our food, clothing, shelter." Justify the statement.*

46. *How do we utilize the sunlight of past ages ?*

N.B.—For answers to questions 23 to 43, please consult the chapter.

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PART II

EVERYDAY SCIENCE

"The more we seek the more we gather."—*Dogar*.

INTRODUCTION

What we call science (*Latin : scientia, sciere* : know) has been roughly described as "the organised attempt of mankind to describe how things work as casual systems." Each one reads of Nature's Book a little and a little more and each one begins where the last leaves off.

Science is also defined as a branch of study which is concerned either with a connected body of demonstrated truths or with observed facts systematically classified by being brought under general laws, and which include trustworthy methods for the discovery of new truths within its own domain. There are two main divisions of science, natural and physical. The term may also be defined as the ordered arrangement of ascertained knowledge, including the methods by which such knowledge is extended and the criteria by which its truth is tested. Perhaps Science is most clearly defined by saying that it is, firstly, a vast collection of facts expressed in exact and unambiguous language in such a manner that anyone who cares to take the trouble can test their truth; and, secondly a collection of rules or laws which express the connection between the facts. So long as man believed each other's assertions without testing them, knowledge made little progress. But when they tested their facts as right by doing experiments for themselves, science began to grow.

Nature, with all her phenomena wide open, has been there all along. But man does not appear to have known much of it till recent times. The more he seeks the more he gathers. The present generation cannot, as a matter of fact, claim to have attained the maximum heights of progress. The mysteries of Nature still lie far ahead of human reach.

Men of science have never been satisfied with the lot of man, nor with their knowledge of the world in which they live. They have constantly sought to reach out for what they did not possess and to seek an explanation of what man did not understand. From the days of the caveman to this age of atomic power, there has been a long, hard struggle

for understanding. This struggle has been both against heavy odds of Nature and the ignorant common man, who has been very conservative, even to the bitterest end, in realising the Laws of Nature—the truth.

Most of the facts about Nature that we possess today, were established after a terrible struggle. It has all along been a very difficult task to tell the truth against an established false belief. Galileo—who dropped the balls, one heavy, one light and proved that they reach the ground at the same instant, and was bold enough in telling that Aristotle had been wrong all those centuries—was persecuted. When Burno told the people that the earth is not the only important place in the universe he was burnt to death in Rome. Copernicus realised that the earth and the other planets revolve round the sun, but, for fear of punishment, perhaps torture to death, he kept his discovery secret from all except those whom he considered his confidential friends. Still the word of his belief got round and he suffered persecution. He waited until almost the last minute before giving the manuscript to a publisher. The first printed pages of his great work were put into his hands as he lay dying. He could feel them but could not see what he had written. There have been so many other similar cases which cannot find space here.

Men of science realise the truth—"the Laws of Nature" —by careful constant study of different happenings in Nature. The "Laws of Nature" mean the laws that are deduced from an observation of natural phenomena which correctly account for the invariable sequence between specified conditions and specified phenomena. The scientist observes a certain phenomenon and tries to account for it. He collects all the information and observable facts about the phenomenon and attempts to correlate them into a statement which would always be true. He formulates a certain law and tests its truth by applying it to observed natural phenomena. In case it stands the test, it becomes a "Law of Nature" until a more advanced and exact knowledge disproves it as, for example, the Theory of Relativity has at last proved that Newton's Laws of Motion are only first approximations to the real truth. A scientist does not take anything for granted but tries to satisfy himself as far as possible.

Modern civilization owes largely to science its acknowledged success in dealing with the material world. That success has caused the ideas of science to exercise a great influence in shaping the thinking of the age.

In the three centuries, since Galileo, the success of the sciences in dealing with the matter has been very great. It is hardly necessary to elaborate. One has only to look around to discover how wide the field of science is, how numerous is its application in daily life. One lifts the receiver and hears a voice, soars high amidst the birds, above the clouds, even higher than that floats on the surface of the sea, goes deep into it for as long as he likes, sees and hears a person speaking from far, far away—thousands of miles away—locates and silences a hidden but roaring gun, types words from as far away as he may choose, sees an enemy lying hidden in trenches quite clearly, can see the stars in the remotest parts of the high heavens, can aspire to visit planets and the moon, can drop himself down safely from thousands of feet above the ground. It is these and many more similar topics that have been taken up in this part of the book.

SECTION I

LIFE ON THE EARTH

"In Nature's infinite book of secrecy a little do I read."
—*Antony and Cleopatra.*

CHAPTER 1

THE PROCESSION OF LIFE

There are animals, plants, birds, etc., on our planet which we can see. It may be that life exists elsewhere in other planets, in some remote nebulae, we do not know. All that we know about life, we know from observation round about us on the earth or very near to the surface of the earth.

What is life ? The question of the life is a big one. The chemist, the physicist, the biologist, and the psychologist each tells us very shortly what he thinks of life.

The chemist tells us that all living creatures are built up of the same kind of stuff, which is called *protoplasm*, defined by Huxley as the physical basis of life. A chemical similarity makes the whole world akin. He is greatly struck by the orderliness of the living laboratory by the way in which processes of building-up make good all the breaking-down and by the quickness and quietness of it all.

The physicist who is chiefly concerned with energy (the power of doing work) and its changes would tell us first that we must not suppose that living creatures create any energy. Like engines which changes fuel into work, so organisms change the chemical energy of food into locomotion and work, sometimes into light, often into heat and also into stores—especially in the plant world. But all living creatures are like engines in being *transformers* of one kind of energy into another. He tells us that he admires living creatures more than his own engines, because they get comparatively more energy out of their food than his engines get of their fuel. A fish has more efficient engine than a

battleship, and a fire-fly is a more economical light-producer than an arc-lamp.

The biologist is the expert on life. The characteristic activities of plants and animals seem to him very different from those of the non-living world.

Thus, life is the condition and state of being alive ; the state in which animals and plants exist, as differentiated from inorganic or dead organic matter. Life is understood through observation of the composition and activities of living things. The fundamental substance of life is protoplasm, which contains those chemical and structural combinations upon which the functions of life depend.

What Causes Life: Life is said to be due to the presence of protoplasm. All living beings must possess protoplasm. Protoplasm (Gr. *protos*, first, *plasma* : form—*plassein* : to form)—means living matter, a homogeneous, structureless substance, forming the physical basis of life, endowed with contractility. It is a semi-solid complex mass made up of carbon, hydrogen, oxygen, nitrogen, etc., along with a large proportion of water. It is contained in small compartments called cells. On the other hand cells form a minute part of an organism and, on the other hand, they exist as a separate living unit.

Living and the Non-living. The primary distinction between the living and the non-living is in point of chemical constitution, and cell structure. It is a fact that all the chemical elements which are found in living protoplasm occur, likewise, in non-living materials of soil, rocks, air and water. There is no single chemical element which is peculiar to living matter. The secret of life lies not in the ultimate substances of which protoplasm is composed but rather in the organisation of these chemical elements into a living system. This is just like a broken watch which does not function, but when repaired it functions because it comes to possess an organisation—the material in both cases is the same.

The bodies of plants and animals are composed of microscopic structures called *cells*, each of which consists of a tiny bit of living substance, or protoplasm, and an enclosing wall or membrane. The cellular plan of

organisation is an exclusive property of plant and animal bodies.

The living things *assimilate*. There exists in living matter the inherent capacity of modifying alien substances and transforming them into the very living substances which bring about the alteration. Man transforms the foods, he ingests into blood, muscles, bones, hair, etc. Plants synthesise sugar from carbon dioxide and water and subsequently transforms some of these sugars and other substances into the proteinaceous living substance. Assimilation is the fundamental feature of growth.

The living things *reproduce*. A little amount of living matter in suitable environment will quickly increase. A pair of hen and peacock would multiply into so many of them. The reproduction is almost of smaller kind. Men generate human beings, cows generate cows, dogs generate dogs, and so on. It appears that in the ovum and in the sperm there are certain fairly small numbers of "genes" (the unit responsible for the development of the inherited characteristics of individuals) which carry the hereditary characteristics. Generally, the genes carry the parental character : but sometimes there are spores or "mutants" which differ considerably from their parents. They occur naturally in a small proportion of cases. It is these spores that give the best opportunity for evolution *i.e.*, for the development of new kinds of animals or plants by descent from old kinds.

A living thing *moves* about. Life may move as swiftly as a flying bird, or as slowly as an expanding turnip, but it moves. It may not be in movement continuously, for many seeds lie immobile for long periods, but sooner or later they burst and stir. The driving force of movement comes from within. All the same, it is not necessary that everything that moves is alive. A car that moves about is not alive. A projectile that moves through a long distance is not alive.

A living matter *is not chemically static* but undergoes continual chemical change. Our blood, for instance, undergoes one kind of change when it circulates round the body and an opposite change on coming into contact with air in the lungs. "The fundamental laws governing living matter

are, in all likelihood, the very same that govern the behaviour of the hydrogen atom, namely, the laws of quantum mechanics."

Living things are *sensitive* to a wide variety of external features on their environment—to light, variations of temperature, moisture and drought ; mechanical stimuli, such as pressure, tension, etc., chemicals, gravity, etc. The non-living things do not possess the power of sensibility.

Origin of Life. The problem of the manner in which life originated on the earth has been puzzling the man. Perhaps for all times, the problem of life's beginning on our planet will remain insoluble, a philosophical question rather than a subject capable of experimental investigation and solution.

All that we know is that living protoplasm (living matter), a homogeneous, structureless substance forming the physical basis of life, endowed with contractibility, with a chemical composition allied to that of albumen, existed on the earth aeons ago, that it probably originated in the oceans which covered most of the earth's surface, and that it was extremely simple structurally, possibly very similar in its minuteness and organic form to some of the organisms which are dwelling upon the earth today. We do not know by what action or series of actions the first bits of protoplasm were formed.

With the passage of centuries, ceaseless changes occurred in the topography (Gr. *topos*, a place, *graphein*, to describe : topograph, description of physical features or configuration of a specified area, usually indicated by a map detailing natural features on a given scale, as well as cities, roads, bridges), the climate, and the plan of the earth's surface and the descendants of the first bits of life, whatever their origin, gradually become transformed into different types of organism. Possibly, this difference in types of organism took place, in part, as adaptation to changing environmental conditions, partly in response to internal genetic factors. In other words, the processes of evolution have been at work and are still at work moulding, eliminating, changing, adding to the various forms of life which live on the earth's surface.

SEVERAL THEORIES have attempted to account for life's beginning.

(*a*) Theory of *Spontaneous Generation* (*L. spontaneous—sponte*, of one's own accord) holds that living organism develops directly from non-living matter. The contention of the biologists who subscribed to this theory was based upon such evidence as the appearance of bacteria extremely, small, single-celled, fungoid plants, single or grouped, reproducing rapidly by cross division or by formation of spores, almost always associated with the decomposition of albuminoid substances, (and regarded as the germs or active cause of many diseases) in broth (*shorba*) or in decomposing meat.

But the idea is not accepted by most biologists. The work of many biologists, including Pasteur, proved definitely that the living protoplasm, which the upholders of spontaneous generation studied, developed from pre-existing protoplasm. Pasteur and others showed that if broth and meat were heated for a time and protected from air currents, no bacteria would develop. Germs are present in the air and when they fall into such organic materials as these, they grow and reproduce.

(*b*) Another view, upheld by Helmboltz, Lord Kelvin and others, states that life on our planet came to us from some other world, possibly from one of the other members of our system. They held that life may have been transplanted to our planet in narrow openings or meteorites and cosmic dust falling on the earth. There is nothing of an impossibility in this transference of life from some other heavenly body. Plant seeds have been found to preserve this latent life even after prolonged exposures to intense cold. Bacteria have been known to withstand appreciably high temperatures. In fact the life-property in the seeds and bacteria lies dormant when the conditions are inhospitable, and it bursts out with full activity when environments are favourable. This idea at times had a considerable following among scientists. In the absence of credible evidence in its support, it has but few adherents at the present time.

This theory also does not serve the purpose. It only provides us an answer to the origin of life on our planet, but does not solve the mystery of *the origin* of life.

(*c*) The theory of *Divine Creation* holds that the Divine Being created living organism from non-living matter. The view has been held since ancient times, entirely as a matter of faith. According to this theory, the dust of the earth may have been infused with life through some agency beyond the material conception of scientists who are inclined to assume that at some time in the dim past, presence of favourable temperature, moisture, etc., produced living protoplasm.

Evolution. Literally, the word means the act of unrolling or unfolding; a process of orderly change ; gradual working out of development ; a series of things unfolded ; the doctrine according to which high forms of the life have gradually arisen out of lower forms of life.

To many people, the word 'evolution' is connected vaguely with Darwin and monkey, with no relation to the evolution that had produced the monkey in the first place. A study of evolution attempts to trace the changes to their origin and to account for their occurrence. Repeated in history, nations have evolved progressively until, after reaching the zenith of their fame and power, their evolution has proceeded at a more or less rapid decline, resulting in some cases in their obliteration. The evolution may be both progressive and/or retrogressive. This disappearance of species, genera and even of families of plants and animals, has taken place while new species and genera have arisen.

The evolution of organism proceeded at first from relatively simple to more complex forms. While the socialist is concerned with the evolution of society, the historian with the evolution of nations—their rise and fall—the scientist is concerned with the evolution of his particular science.

Dr. Austin H. Clark offered a theory in 1937 which he termed 'eogenesis'. According to this theory, life at the beginning was balanced, and embraced all general forms. This theory denies that vertebrates sprang from something lower, doubts existence of missing links and questions Darwinian evolution.

Plants and Animals. Biologists say that at some time in the course of evolution the differentiation of organisms into plants and animals occurred. Such modification pro-

bably did not occur at a single instant in evolutionary history but very likely arose here and there under different conditions at different periods. They cannot logically say that the plant kingdom originated from the animal or the animal kingdom from the plant. It seems that here and there, in the course of evolution, some organism assumed plant-like features in varying degrees, others became animal-like. The changes occurred at different times; some persisted and the differences which they produced became intensified, others weakened and died out. Biologists regard plants and animals as two main branches of the family tree—the branches springing from a common ancestral trunk. They are creatures intermediary between plants and animals which are called 'plantimals' by biologists.

Now the chief differences between plants and animals are :

(*a*) Most plants are stationary. On the other hand, most animals have ability to move from place to place.

(*b*) Animals have a limited scheme of growth, whereas plants have an unlimited one.

(*c*) Most plants have a stru.tural framework composed chiefly of cellulose, a substance absent from the bodies of most animals.

(*d*) Animals are unable to manufacture foods and other complex substances from raw materials of air and soil, whereas plants can manufacture foods and other complex substances from them.

Is Man Getting Cleverer? The human brain may be developing itself to a stage which will make the man of the future look back on the 20th century as an age of mental weakling, says G. N. Ridley, a British scientist, in his new book, "Your Brain and You".

Ridley says that man's intellectual advantage over animals is due to the fact that he has three layers to his brain while they have only two. A fourth may now be evolving which will lead to a corresponding higher degree of intelligence.

Dealing with the relations of mind and body, Ridley claims that high blood pressure, prematurely grey hair, bad teeth and constant colds can all spring from mental strain. On the other hand, children whose bodies lack necessary calcium may become bad-tempered and emotional. Other facts about the brain are that it is made up of 77 per cent water and the energy from half a peanut is sufficient for an hour's concentrated thinking.

The Struggle for Existence. It is a phrase coined by Darwin; although on every one's lips, it is not yet always clearly understood. As Darwin said, the phrase is to be used in a "large metaphorical sense" including endeavours to secure the welfare of the offspring as well as life-and-death competition at the margin of substance.

There is over-production both among plants and animals. A single orchid flower may produce over one million seeds, a single plant of pig-weed may form 20,00,00,000 seeds, one mushroom may scatter into breeze as many as 2,00,00,000 spores. Obviously neither the room nor the food materials necessary for the growth of these enormous numbers of reproductive structures is available—that is, too many offspring are produced to survive.

Competition. Because of the limitations of space and food all these myriads of offspring cannot survive, and they compete with each other for sufficient space in which to grow. The struggle may be for *food*, for *foothold*, for *shelter*, for *mates*, for *satisfaction of appetite*, and so on. It includes all the activities of living creatures when they have to face difficulties and limitations in their environments and for sufficient food materials for their nutrition. Thus there develops a struggle for existence not only among organisms of different species but also among individuals of the same species. Only a small percentage of offspring is able to win in this struggle and to achieve growth and maturity, the great majority of individuals suffering defeat and death in this competition.

The balance of life is maintained by complex relations among many kinds of living things. A grasshopper lays its eggs, which grow into insects and begin at once to eat the tender leaves of grass and other vegetation. In case the grasshoppers are allowed to grow unchecked, there is a danger of destruction

of the kinds of vegetation that are used as food. But birds feed upon grasshoppers, a single bird often eating in one day as many as the entire brood of one mother-insect. The insects that survive are those which while getting their own food escape the birds and also the diseases and climatic dangers that surround them. The birds that devour the insects are themselves the food for other animals. This process results in an equilibrium among the species growing in a particular region, so long as factors tending to disturb this equilibrium do not arise.

CHAPTER 2

PLANT LIFE

Almost everywhere the surface of the land is covered with plants, if they have not been removed by man; and even where this has been done, man has usually introduced other plants to take the place of those he has removed. In countries with abundant rainfall they hide the earth so completely that the landscape is almost wholly green. The bare rocks of either dry or moist countries are usually partly covered with the plants. In the waters of oceans, plants are also found in great abundance.

Why Should We Know About Plants? We are indebted to plants for our very existence. Green plants are the only mechanisms which can convert the raw, inorganic materials of air and soil into complex, organic compounds called foods, which are necessary for the existence of all animal life. All the food we eat comes directly or indirectly from plants.

We get from the plants other necessities of our existence—fibres for clothing, timber for shelter, drugs for our ailments, etc.,—coal, paper, spices, perfumes, rubber tyres for automobiles. Thus, one comes to realise the magnitude of his indebtedness and significance of plants in the scheme of Nature, to appreciate the intricacies and ceaseless activities.

A liberal and balanced education is enriched by a study of plants. Education is frequently defined in terms of its desired results: the most satisfying and the most advantageous adjustment of one's environments. The study of plants is an essential feature of effective education. In man's environments there are two dominant, omnipresent entities—the green vegetational cover of the earth and the sky. The appreciation of artistic and literary work is frequently enhanced by some acquaintance with the living plants. For an intelligent appreciation of most of the phenomena which conduce not only to our maintenance of food and clothing but also to our

comfort, health and aesthetic or purely intellectual pleasures, a study of plants is necessary.

Apart from its uses as a training in observation and in scientific principles, the study of plants opens up a wide field of interest for any intelligent student.

"There are philosophical rewards in the study of plants. The appreciation of the beauties of flowers, of forest, and all other aspects of plant life is sharpened and amplified by a knowledge of the myriad activities which occur behind the stage of Nature and which is apparent only to those who seek them out. Further, the realization of the unifying principles of plant and animal development and behaviour, the awareness of the order and magnificent design underlying the growth and structure of plants and the discovery of the sensitive balances and counterbalances regulating the lives of all organisms, contribute to the unfolding of a sane and appreciative philosophy of life and of man's place in nature's economy."

Those who intend to embark upon professional careers in the applied plant sciences—forestry, horticulture, plant breeding, soil conservation, pharmacology—require knowledge of plants.

Variety Among Plants. The plant-covering is not everywhere the same. Instead there is infinite variety, and at first sight there seems to be little system or order. The plants, however, do not grow altogether at random. Each kind of plant requires for its growth certain conditions that may be partly or entirely differen from the conditions required by other plants. For this reason any place in which the soil, moisture, temperature, and other conditions are favourable to one or a few kinds of plants is likely to be an unfavourable place for certain other plants. Thus the hilltop which affords just the right conditions for the growth of oak and hickory trees is not equally favourable to the growth of elm or willow, and these are not usually found there.

Plants which can find suitable conditions for their growth at the same place are likely to be found together. A group of plants which are commonly associated in this way is known as a plant *association*. There are many kinds of plant

associations and these constitute an important subject of study. Those types of plant associations in which trees are most conspicuous part are known as *forests*. There are other types in which grasses are most important, and they are known as grasslands and *meadows*. Such societies imprint their characters on the landscape, and ordinary language recognizes their importance in the topography of the country-side.

Geographical Changes of Plants. Extensive geographical and climatic changes from tropical heat to arctic cold have been and are taking place on our earth. They have converted dry lands into sea-beds, and upheaved the bottom of the sea to form new dry lands. These climatical and physiographical changes which take ages to come about, have had influence upon terrestrial floras. As the temperature changed and became, say, colder, one by one the warmth-loving plants died out until only a few were left; and when warmth returned flora of warm regions returned. Darwin made a special mention of these floral migrations one in one place after describing the close of Glacial period (epoch in the history of the earth, when vast portions of its surface were covered by ice probably 5,000 ft. thick) said: "As the warmth returned, the Arctic form would retreat north-wards, closely followed up in their retreat by the productions of the more temperate regions, and as the snow melted from the bases of the mountains, the Arctic forms would seize on the cleared and thawed ground, always ascending, as the warmth increased and the snow still further disappeared, higher and higher, whilst their brethren were pursuing their northern journey. Hence when the warmth had fully returned, the same species which had lately lived together on the European and North American lowlands, would again be found in the Arctic regions of the Old and New Worlds, and on many isolated mountain summits far distant from each other. Thus, we can understand the identity of many plants at points so immediately remote as the mountains of the United States and those of Europe. We can thus also understand the fact that the Alpine plants of each mountain range are more especially related to the Arctic forms living due north, or nearly due north of them; for the first migration when the cold came on, and the re-migration on the returning warmth, would generally have been due south and north. The Alpine plants, for example, of Scotland, as remarked by

Mr. H. C. Watson and those of Pyrenees as remarked by Ramond, are more especially allied to the plants of northern Scandinavia; those of the United States to Labrador; and those of the mountains of Siberia to the Arctic regions of that country."

The vegetable kingdom has had its ebbs and flows, its developments and degenerations. According to Mr. C. E. Taylor, "The story of the life of plants is one nearly analogous to that of the men full of failures and successes, of ambitions, efforts and degenerations ending in extinction! The path of human history is thickly strewn with projects and follies, and the strata of the earth's crust are equally abundant in the remains of fossil plants belonging to genera no longer existing, showing us that the pedigree of the vegetable kingdom has suffered the same incidents as that of humanity. In each case out of the weakness has evolved strength. The extinct types of plants served as platform on which more highly-organised forms could be evolved—the follies of mankind have been the means of developing higher wisdom and prudence. Every generation, both in plants and man, has originated new character and unexpected habits."

Food. A plant has need for food as we have, and in addition it has the power of making its food supply from such simple substances as carbon dioxide, water and other compounds. If a plant is not interfered with, the food which it manufactures commonly is used by it and for its own purposes. For instance, a part of our food is composed of starch from wheat grains, but if the wheat had not been disturbed, the grains would have fallen to the ground, where under favourable conditions they would have started to grow in new wheat plants. The young plants would have used the food that was stored up in the grains.

Just as in man so in plants, food-supply is needed not only to replenish waste but also for the growth of plants. Both the living protoplasm and the cell-walls must be built up from food materials.

The Food Substances Required. The actual food substances which living things can use are limited. Protoplasm is a mixture of certain chemical substances called *proteins* and

a solution of various salts in water, together with small quantities of the substances related to fats and sugar. As the source of energy, the substance usually used is *sugar*, though *fats* and even proteins may be used at times. The main food requirements of *all* living things are, therefore, essentially the same—proteins, salts and water for growth, with sugar (and fats in some cases) for energy.

The Use of Food Plants. If food, which is stored, is not used by men or removed in some other way, the plant will use it in its processes of growth. Take the case of beans which contain much protein material, and this is in an insoluble form. If a bean is planted and starts to grow, the protein grains in the bean will be digested by the aid of an enzyme and dissolved after which they may be carried to the growing parts, where the protein material will form additional living protein—protoplasm.

This is a wonderful process. The digested and dissolved proteins are dead materials, but the protoplasm which is formed from them is a living substance. Therefore, a dead material has become a living one. Proteins are the only materials in which life may exist, and the only known way by which non-living protein may become living material by uniting with some already living substance and thus becoming part of it. This process whereby non-living protein material unites with the living protoplasm and thus becomes living material is called *assimilation*—a process the exact nature of which is not known. Precisely the same thing happens in our bodies when the digested food is dissolved, carried through the body in the blood and assimilated by the cells.

The Circulatory System of Plants. Under the bark of a tree lies a bundle of hard-walled tubes—part of the circulatory system of the tree. The larger tubes, or *ducts*, carry water with its minerals from the root hairs up the stem and into the leaves. Other ducts carry the manufactured food in the leaves down to all parts of the plant.

The roots of plants contain root hairs; each root hair is a long, hair-like cell with a membrane around it. Soil water and minerals enter plants through these membranes by diffusion and circulate throughout the plant.

When the food has been manufactured in the leaf, another system of the tubes distributes it. The tubes which carry water to the leaves are called xylem, the food-carrying tubes are called phloem.

Food Circulation in Plants. Since plants do not possess a heart to pump liquids through it, it must depend on the process of diffusion to speed the materials it needs through the protoplasm of the cells. The circulatory systems of some plants rest in the autumn when their leaves drop off and the sap containing the manufactured food is stored in the lower part of the trunk. In the spring, the liquid food rises in the tree and with the development of leaves, photosynthesis begins.

Digestion of Food. Digestion is the process whereby foods, which are insoluble or very complex chemically, are converted into foods which dissolve more readily in water or which are simpler chemically. Only water-soluble foods can be moved from one part of plant to other parts. Digestion proceeds virtually in all living cells, but is especially active in the cells of tissues which store considerable quantities of food. Liquids and solids dissolved in liquids are able to pass from cell to cell by osmosis. By osmosis the sugar may travel from cell to cell in the leaf until it comes to the veins, along which it travels to the stem and so throughout the plant. Food material is usually found in plants in the form of starch and other compounds which cannot be solved.

The question arises, how is it that food can be transferred to the various parts of the plants where it is needed. Certainly the solid grains such as grains of starch, cannot travel far through the plant unchanged.

Digestion of Starch. The starch (the pure fecula or white farinaceous matter of plants) does not ordinarily dissolve in water, but it is rather easily changed into sugar, and the sugar will dissolve. If you examine with a microscope some starch grains from a sprouting seed, where the food material is being carried away to be used in forming new plants, you will find that the grains of starch are not smoothly rounded as they would be at any other time, but rough with many holes on the surface, as if some of the starch had been dissolved from each grain. Plants have a substance (called *diastase*) which has the

peculiar property of causing starch to change slowly into sugar if the diastase is brought in contact with the starch. This substance is in the plant sap (the vital juice of plants). It acts upon the starch at the surface of the grains, and the rough, pitted appearance shows where the starch has been so changed and dissolved. This process of changing an insoluble substance into a soluble one is called *digestion*. Insoluble food can be transferred from place to place through the plants only after they have been made soluble by digestion.

The dissolved food materials may pass from cell to cell throughout the plant. When food reaches the large pores or tubes in the stem, it may pass upward with the general movement of water. Passage in a downward direction occurs through tubes in the inner bark. Immediately within the tissues through which the manufactured food passes downward, is the layer of tubes through which water passes upward in the stem. The veins of the leaves are composed of tissues similar to those of living wood and bark, and liquid material moves in them as it does in the wood and bark.

Food Storage. When the food is in solution and is capable of being transferred from place to place within the plant, it may either be used immediately for repair and growth or it may be stored.

When food is stored it is usually changed into an insoluble form again. As for example, sugar is commonly changed into starch. Food may be stored in almost any part of a plant, but usually it is stored in large quantities only in much-thickened part—examples of thickened various bulbs and tubes, fleshy fruits and seeds. Very often food is deposited in the roots and other underground parts of the plant. In these cases the food which is made and stored during the summer commonly serves for the plant's growth during the earlier part of the following seasons.

The large amount of food which is brought together within a small space makes these storage organs of plants an important article of food for men and animals. Wheat, rice, beans, peas, corn, oats are all stored foods.

The Root. The root is that part of the plants which tends to turn downwards away from light and towards water.

As a rule, it bears neither leaves nor buds. Usually, at the apex, it has a protective cap of tissue called the *root-cap*. A little behind the root cap, there is a limited space which bears *root-hairs*. Root absorbs water and raw materials from soil. This is done with the help of the root-hairs, which adhere to the soil particles and absorb water and soil particles from them. The obvious function of root is to draw up water from the soil and at the same time to provide an inlet for the mineral salts and nitrogenous compounds in the soil, essential for the growth of plant. Water from the soil is as important to the plant as anything else. It carries the food essentials of the plant, distends the plant cells and tissues, and thus keeps the leaves and branches in extended position. When there is an insufficient supply of water, the leaves drop and ultimately die. The water is sucked up from the lower layers of the earth, it is absorbed at the end of root-hairs and pressed forward mysteriously to stem, branches and leaves, from one to another.

Many roots become thick and fleshy and store large quantities of prepared food material to be utilized by the plant during unfavourable periods. In some water plants, they serve as floats. There are roots of some plants which breathe for them. The root fixes plant firmly in soil. In a tap root, the lateral branches spread in all directions while in the monocots the anchorage is afforded by the fibrous additional roots. The stilt roots help the plants to remain erect when the subterranean anchorage is not enough. The pillar roots of plants act as pillars for supporting the weight of the branches.

The Stem. The water with its dissolved nitrogen and mineral salts is pushed on through microscopic capillary tubes in the main stem and thereafter into the various branches and the veins of the leaves. The plant is constantly sucking water from the soil and forcing it into the air through the millions of tiny breathing holes in its leaves. But there must also be a system of pipes to take the food, when once it is formed, to feed the various parts of the plant. The system is provided by another set of pipes which lie nearer the outside of the stem than the little waterpipes, immediately below the bark and coming off with it. The stem not only provides the two systems of pipes to the plant but also serves to keep the plant

upright and bears the weight of the plant.

The Leaves. A shepherd will say that leaves are food for goats, camels, etc. A common man will say that they give shade, and adorn a plant. But, actually, as botanists tell us, they serve very important function in the nutrition of plant. They serve to assimilate carbon dioxide from the atmosphere and water with salts in solution brought up through the roots.

Chlorophyll is the substance which imparts the green colour to the leaf and in the presence of sunlight has the property of becoming able to break up carbon dioxide into oxygen, most of which is liberated into the air and to use carbon which is combined with the salts brought up from the roots to form the various substances of the plant body. Their function of splitting up carbon dioxide gas into carbon and oxygen within the cells of the leaves has earned them the name of "veritable laboratories of nature". For this splitting up work, energy is taken up from the sunlight, and this explains *why plants cannot live in the dark; why leaves of all the plants spread their maximum surface to receive the sunlight*, and also why individual leaves in a cluster arrange themselves so as to be always sure of finding a place in the sun. Plants grown in dark cellars lose their green colour and eventually die. It is found by experiments that plants reared in sunshine turn their brown colour of tincture iodine into deep blue, while those deprived of sunlight from their birth are unable to effect this change of colour. The analysing scientist tells us that this indicates the presence of starch in the former and the lack of it in the latter.

The plant leaves absorb the carbon dioxide from the water and give off this oxygen gas. The process goes on during the day-time in all plants and consequently helps in reducing the excessive quantity of carbon dioxide, resultant on respiration and combustion while adding to it that of oxygen gas. As a matter of fact, the plants breathe too, in just the same way as animals, by breathing in oxygen and breathing out carbon dioxide.

Towards the upper side of the leaf or one or more layers of elongated cells and on both sides the leaf tissue is enclosed in a compact outlayer, pierced by minute openings called

Stomata. Through the stomata-carbon dioxide passes to the intercellular spaces. They also serve as the way out for the excess water taken up by the roots. In dry weather, there is a danger of excessive evaporation of water from the leaves, and to guard against this, nature provides these stomata with power to adjust their orifices contracting them in periods of drought.

Leaves vary considerably in types, from the needle-like leaves of the pine to the circular, shield-like leaves of the water-lily. Leaves are of many shapes; may be simple or compound; with an entire or dentate, serrate, crenate margin; bifacial (oak) or isobilateral (iris): sessile or stalked; and with reticulate or parallel arrangement of the main veins.

The Colour of Leaves. It is generally green. It is caused by the presence of the green pigment (paint) *chlorophyll*, which constitutes the fundamental machinery of food manufacture in plants. Chlorophyll is an unstable pigment and is continually being decomposed by light. Simultaneously it is synthesised by the living cells of leaves, so that the chlorophyll content of leaves does not alter appreciably during the growing season. Absence of sunlight has a destructive effect upon chlorophyll synthesis, as is shown by the fact that plants kept in darkness do not become green. Along with chlorophyll there are present in most leaves two other pigments—yellowish and yellowish-orange. These substances are present in relatively small quantities as compared with chlorophyll. In some leaves with large amounts of these yellow pigments, the deep green colour of chlorophyll is somewhat lightened up by the colour of the other two yellowish paints.

In the autumn, chlorophyll disappears from the leaves and the yellowish paints, marked earlier by the chlorophyll, become apparent. The formation of red and purple pigments in leaves in autumn follows the development of certain disintegrating products and is in some manner related to the sugar content of leaves.

Leaf-fall. The leaves of *deciduous* (not evergreen) trees and shrubs fall off the branches on which they grow. This happens at the end of their growing season. In case of *evergreen trees*, leaves are shed at intervals, usually as new leaves are formed. The causes of leaf-fall are similar in both

deciduous trees and evergreens, the difference being in the time and extent of their leaf-shedding.

The causes of leaf-fall are noteworthy. In autumn certain cells at the base of the petiole (*tehni, dandi*) become meristematic and form a layer of thin-walled cells across the petiole base. This layer, known as the *abscission layer*, begins to disintegrate shortly after its formation, as a result of the softening of its cell-walls. This distintegration continues until the leaf is held to the stem merely by the vascular bundles of the petiole.

Flowers. A lay observer may be inclined to relate the properties of colour and fragrance of flower to the satisfaction of aesthetic instincts of man and perhaps of bees and butterflies. But actually the brilliant colours of a flower and the nectar (*mitha ras*) in it have still more higher functions to perform. They attract bees and butterflies for the transport of fertilizing sperm-cells from one flower to the other. The bees, moth, and butterflies are the medium which Nature uses as the carriers of the fertilizers from one flower to the ovaries of a distant flower. This cross-fertilization is brought about in their innocent flights in search of the sweet juice, nectar of the flowers. When these insects visit flowers and suck in the nectar from the bottom, their legs get dusted with the yellow pollen, and this they deposit, unknowingly, at the other flowers.

The flower is the productive organ in seed plants. It consists of four distinctly different kinds of structures; some of these structures may be absent. The flower contains for reproductive purposes: the *pistil*, which forms the seed and develops it; *stamens*, which produce the fertilizing elements in the form of pollen; the *corolla*, or group of petals, to enclose and protect pistil and stamens during their development; the *calyx*, or green outside leaves of the bud, which hold and guard the pistils while the seeds ripen. An average flower has all these four parts, with the corolla, the largest, showiest, sweetest scented, in order to attract the insects which, like the winds, act as fertilizing agents; but many flowers are exceptions, having some part omitted or modified. Ferns have no flowers; birch and oak catkins are inconspicuous (not clearly visible) flowers.

Kinds of Plants. Algae are the simplest green plants numbering about 14,000 species. Their body is not differentiated into root, stem and leaves. They are, usually, very small in size and occur as dark green or black patches on wet walls or floating on the surface of ponds. Algae are unicellular and multicellular forms. They reproduce by spore formation. *Spore* is a cell capable of directly developing into a new plant. They also produce sexually by fusing and then developing into a new young alga filament.

Fungi comprise of mushrooms, toadstools, moulds, species. As there is no chlorophyll in fungi they are not green. Some plants *e.g.* mango etc. get a coating of fungi in wet months. Toadstools and mushrooms grow on wet decaying wood or animal refuse. They live on dead organic matter or living organisms from which they draw their food.

Lichens are small, usually grey or green plants, variable in forms, growing on dead wood tree trunks, rocks and on the ground. A lichen is not a single plant but an alga and fungus living together as symbionts.

Bryophytes are plants which act as a link between the lower and higher plants. They comprise mosses and liverworts numbering about 20,000 species. They are small, rather inconspicuous green plants that live mostly on moist soil, rocks, treetrunks etc. Bryophytes are mostly flat, plate-like or ribbon-like in shape but may be plant-like with stem and leaves. Reproduction takes place by sexual means. The male and female sex, cells fuse and form a new plant after further growth.

Petridophytes are more highly organised than the bryophytes. They comprise ferns numbering about 6,000 species. The plant body consists of an underground stem with roots into the soil and leaves in the air.

Seed plants, or seed-bearing plants are most numerous, about 1,90,000 species. They are divided into two groups *viz. gymnosperms* and *angiosperms*. In the former group seeds are naked, that is to say they are not enclosed within a fruit. They are tree-like plants. Their species number about 500.

Angiosperms bear flowers. Their seeds are enclosed within the fruit. They are more numerous than the gymnosperms and are the dominant group of plants. They are also known as 'flowering plants'. Angiosperms, which are small and tender are known as *herbs*. The herbs, which die within a year, *e.g.*, rice, mustard are known as *annuals*. Those herbs which last for two years *e.g.*, carrot, turnip, radish etc. are known as *perennials*. Plants having comparatively stronger stems and average size *e.g.*, china rose, croton etc. are called shrubs. *Trees* are those plants that are usually strong and longlived as mango, almond etc. *Climbers* have very long but weak stems which wind round a support.

Classification of plants according to their food securing habits. Most of the plants manufacture their own food. Some plants, mostly those that do not possess chlorophyll, depend upon other organisms and on decaying organic matters for their food supply. These plants are known as *heterophytes*. Those heterophytes which absorb their food and get shelter from living organisms (plants, *e.g.*, broomrape, dodder etc. are called *parasites*. *Saprophytes* are the plants which draw food from dead organic matters *e.g.*, neottia, and some fungi etc. Certain plants attract insects, kill them and extract food from their bodies. Such plants are known as *insectivorous* or *carnivorous plants*. The common examples of insectivorous plants are plants such as pitcher plant, sundew, bladderwort and butterwort etc. *Epiphytes* are plants which possess chlorophyll but grow upon other plants and do not absorb food from them *e.g. orchids*. Such plants have hanging roots which absorb moisture from the atmosphere. When two plant organisms live together but do not harm each other and are of mutual help, they are called *symbionts* and the phenomenon is known as *symbiosis*. The common examples of symbionts are bacteria and root nodules of pulses.

Flora

Banksia—a shrub with clusters of yellow flowers, found in Australia.

Buckwheat—an annual grain plant, native to Asia and grown in Europe and the U.S.A. The grain or seed is used as a stock or poultry feed, or ground as a flour sometimes grown as a cover crop, it enriches and lightens the soil.

Cardamom (*ilaichi*)—a spice grown in Travancore and Ceylon, medicinally a stimulant and digestive.

Cedar (*deodar*)—a tree of the fine family, with fragrant, durable, wood. It burns with a sweet, incense-like scent.

Cinnamon (*daar chini*)—the inner bark of a tree found chiefly in Ceylon. The bark is peeled off from young branches twice a year and dried. A valuable oil is extracted which is used in medicines as a stimulant and antiseptic.

Clove (*laong*)—the dried, unopened flower bud of an evergreen tree native to the Moluccas in the East Indies. The bud, harvested between October and February, is dried first in wood smoke, then in sunshine: the original red colour is changed to a deep brown. It is used chiefly as a spice, also has medicinal value, being used as a remedy for toothache.

Coca—a shrub native to the mountains of Peru and Bolivia, its leaves are chewed for power for enduring fatigue, it yields alkaloid cocaine.

Cumin—the seed of a plant grown in Arabia, near the Nile and Mediterranean coast.

Ebony (*aabnus*)—hard, heavy wood from tropical trees, when rubbed with catskin produces frictional electricity, grown in East Indies and Ceylon.

Eucalyptus—a tree grown in Australia and Indo-Pakistan, yields a fragrant oil known as Eucalyptus oil.

Fustic (*tej*)—dyestuff obtained from wood of tropical America and West Indies, produces a yellow colour.

Gamboge—the hardened sap of a tree belonging to Indo-China.

Indigo (*neel*)—a naturally occurring blue dye found in the juice of several plants, grown in tropical South-East Asia.

Ivy—a climbing shrub, evergreen, can climb by means of small adventitious roots to great heights over rocks, trees or buildings.

Jute—a plant grown in East Pakistan and Bihar, Orissa, West Bengal (Bharat); its bark yields a fibre.

Logwood—a dark-red wood found in Mexico and West Indies.

Mahogany (*mahagani*)—a tropical tree found in Mexico (America): a valuable fine hard wood, specially fit for high-class polish.

Mangrove—a kind of tropical trees, grows in coastal swampy places. The stems and branches send out roots that reach down into water. Its fruit is edible and used in making wine.

Mistletoe—an evergreen parasitic plant.

Myrrh—a gum-resin obtained from a small tree growing in Arabia and East Africa. When distilled, it yields an essential oil. The resin is used in tooth powders and in the manufacture of perfumes.

Nutmeg (*jaifal*)—a kind of fragrant nut.

Poppy—a large genus Papaver, with erect stems and vivid flowers on long stalks grown in Europe and the U.S.A.

Poppy-seed (*khash-khash*)—its oil is used for cooking and mixing colours and in soap-making.

Protoplasm—living substance, constitutes the cell of plants and animals.

Sarsaparilla—a climbing plant native of Central America, contains a volatile oil, used in medicines.

Soya bean—a nutritious food article; its oil is used in many ways, native of Manchuria.

Sultana—a kind of raisin obtained by drying a kind of white grapes grown in Smyrna.

Teak (*Sagwaan*)—a tree sometimes over 100 ft. in height, the timber is hard and durable, mainly used for shipbuilding, railway sleepers, etc., chiefly in Burma and Siam.

Turmeric (*haldi*)—an extract from underground stem of a plant found in China, Bharat, Pakistan and Indo-China.

Upas—a tree found in Java and tropical Africa: its juice is poisonous.

Wattle—several kinds of acacias found in Africa, Australia and the Sudan.

Yam—(*kachalu ki ek qism*)—a species of perennial climbing plants. The large tuberous roots of the yams form an important article of food in tropical countries. Yams are natives of China and the East Indies, but are extensively grown in West Indies, Algeria and France.

CHAPTER 3

THE ANIMAL WORLD

As already stated, biologists generally hold that the present animal and vegetable forms of life are the result, not of a sudden and dramatic "creation" but of a long and gradual process known as evolution"—the succession of one form by another as a result of such varied factors as food, climatic conditions and geographic environment. The bifurcation into plant and animal kingdoms of the living organism began at the lowest stages of unicellular organisms. From the simple amoeba we ascend to the higher and more complex organisms in the animal world.

The protoplasm in animals differs from that in the plants in the fact that it is not surrounded by the restricting cellulose wall. The first characteristic of this unit of life is that it can move. Plants build themselves up from the elemental raw materials—oxygen, water, carbon dioxide, gas, and some simple chemical salts. Animals eat food which has already been built up in vegetable form for herbivorous (*nabatat khor*) animals and in flesh form for carnivorous (*gosht khor*) animals. Plants take in their food at all parts of their body, roots and leaves. But animals have in general one passage for the intake of food. Plants do not require muscles for moving themselves about in search of food. They have neither a brain to work the muscles nor a complicated nervous system to tell them where to go and what to avoid. The animals, on the other hand, have to move about in search of ready-made food and consequently they require a skeleton with leverage arrangements of limbs and muscles, the eyes, ears, and a sense of touch and taste. They possess a complicated digestive system including teeth, gullet, stomach, liver, etc., for the assimilation of complex foods. The factors of reproduction further mark off the two spheres of living organisms.

Amoeba is a unit of protoplasm having no cell walls, but two layers, *electroplasm* and *endoplasm*. The common

amoeba is about 1/100 of an inch in diameter. Amoeba performs within itself all functions of life, reproducing by dividing into two amoebae. Amoeba is found in fresh water, damp earth, and in dysentery, pathologically in the body of man. When the amoeba comes across any smaller creature or particle of food, its protoplasm surrounds the prey completely. A secretion of some acidic fluid is then sprayed upon the engulfed organism to kill it, and thereafter the assimilative process of digestion becomes active. The amoeba thus grows adding to the amount of its living substance from the products of digestion. There are, however, limits to its growth, beyond which either the protoplasm will burst out of its thin enclosing walls or it will be smothered to death by the deficiency of oxygen which its small surface will not be able to absorb in sufficient quantities for the sustenance of its whole protoplasm. This is avoided by the bifurcation of the amoeba into two similar bodies each carrying half the nuclear matter.

Animals and Food. Animals secure their food directly or indirectly from plants. Some animals devour the green leaves of plants. Others eat plant food that has been stored in stems and roots. There are others who eat rich grains and fruits that have been made by plants, still others devour animals that have eaten plant food. In most of the cases the food is masticated. Mastication, usually, involves the addition to the food of liquids, which, while making chemical changes, also make swallowing easier. Another process, digestion, helps further in reducing the food to a liquid condition. Liquid foods can be taken through walls of the digestive system by the process known as absorption. It may then enter the circulatory system and by circulation may pass to the various parts of the body. When assimilated, food becomes a part of the living protoplasm of the body.

Transportation and Assimilation of Food. The digested food is absorbed and enters the blood. A new supply of oxygen is taken up as the blood passes through the heart and is driven through the arteries into the capillaries. From the capillaries, the protoplasm takes up the required materials and the waste products pass into the blood. The process by means of which living protoplasm takes up food material and makes it a part of itself is known as assimilation.

Circulation. In the higher animals and man, the heart is an organ which by means of its beats or contractions forces the blood through the body. The blood flows away from the heart through the arteries, which divide and subdivide it into smaller and smaller branches. They terminate into many extremely small tubes, known as capillaries which are interwoven into a fine network. The capillaries are in direct contact with the cells of the body. They unite and form into small and large veins and lead back to the heart. The movement of the blood is very rapid.

Removal of Wastes. One of the important functions of the blood and the circulation in higher animals is the removal of liquid wastes. This function is performed by a system of excretory tubules in planaria. In many cases the liquid wastes are collected by the blood and are removed from the blood by the kidneys. The blood collects from the cells the gaseous waste carbon dioxide.

In some cases (as in the case of earthworms) this waste is removed through the outer layer of the body wall; in the case of a fish it takes place through the medium of gills; and in air-breathing animals it is the lungs through which the carbon dioxide of the blood is removed.

Distribution of Head Water. The oxidation of food (and protoplasm) releases energy, much of which is in the form of heat. Provision is made for the discharge of excessive heat through the agency of breathing and through the skin. The blood also is involved in maintaining a normal content and a normal distribution of water.

Respiration. People often think of respiration as merely involving the processes of taking air into the lungs and then expelling it. That process is breathing and constitutes a small and relatively superficial part of respiration. We breathe ordinarily about eighteen times per minute, thus constantly renewing the air within the lungs.

As the blood flows through the thin walls of tissues of the lungs, some of the oxygen of the air combines with the red colouring matter (haemoglobin) that is found in the red blood atoms. When oxygen is combined with the haemoglobin the corpuscles are bright red. Therefore, when the blood has been

in the lungs for a time and its red corpuscles have taken up a load of oxygen, the blood is bright red and returns to the left side of the heart with a distinctly different colour from that which it had when it was sent from the right ventricle, while the blood is in the lungs, the larger part of its carbon dioxide is discharged, so that chemically the blood leaving the lungs is quite different from what it was when it entered them. It contains much less carbon dioxide and much more oxygen.

When the blood is pumped from the left ventricle through the arteries to the tissues of the body it carries digested food material and new supply of oxygen. Through the walls of the capillaries the protoplasm of the tissues takes up digested food and oxygen, and at the same time waste products from broken down protoplasm (carbon dioxide, for example) pass into the blood. Oxygen is used by the protoplasm. When protoplasm breaks down, energy is released, and this energy keeps up the activity and life processes of all living things, both animals and plants. It is this introduction of oxygen into the tissues and its use therein that constitutes the most important part of respiration. Respiration includes the exchange of the air in the lungs by breathing the chemical change of the air in the lungs and the interchange of oxygen and carbon dioxide in the tissues.

There are other waste products in the blood which have been taken up from the tissues and which are eliminated through the kidneys.

Kinds of Animals. Animal kingdom is primarily divided into two sub-kingdoms: the *Vertebrates* and *Invertebrates*. Thus a man, sparrow and fish, though very dissimilar in general form, will all be seen to have certain features in common. They may vary enormously in length and number of limbs, presence or otherwise of tail, nature of the body covering etc., but one and all possess a backbone, enclosing a central nerve-cord, from which all the rest of a complex nervous system divides into branches.

The vertebrates include all creatures with a central nerve-cord enclosed in a body, or cartilaginous canal—the spinal column. Such creatures range from man down to semi-wormlike forms, which are, however, only superficially wormlike, and are actually much more highly constituted.

The vertebrates are divided into the following classes:—

1. **Mammals** are the highest of the vertebrate group of which man is one. They are characterized by the presence of glands in the female secreting milk for the nourishment of their young, and by hair in place of feathers or scales. They have warm blood, lungs, a four-chambered heart and a muscular diaphragm that separates heart and lungs from abdominal organs. They differ in appearance and habits. Some of them live in water, *e.g.*, the whale: some adapted for flying, *e.g.*, the bat, and some of them live in trees, *e.g.*, the ape. A few, including the platypus, lay eggs, but most of the mammals reproduce living young.

Mammals, as the biologists believe, have become differentiated from reptiles. They have estimated that mammals had their beginning some seventy million years ago. For many million years prior to that time, when the great land masses known today were quite differently disposed, the reptiles dominated the earth. The vast continents of America, Europe and Asia were largely covered by sea, and both land and water enjoyed a more universal and genial climate than today. In such an environment swarmed those multitudinous and monstrous reptiles whose fossil remains now awaken awe and wonder in us. The age of reptiles, the biologists tell us, was so much longer than any other epoch in earth's history that its sudden termination is the most startling. "Cataclysmal upheavals of land and water, coupled with climatic changes, no doubt, contributed largely to the downfall of monsters, lizards, etc. Many perished in quicksands, others were marooned in sparsely vegetated areas, and in addition it is more than likely that the earliest mammals helped in their annihilation.

2. **Birds** are warm-blooded *i.e.*, they maintain a constant body temperature irrespective of atmospheric temperature, vertebrate covered with feathers, having the fore-limbs modified into wings with which they fly, the jaws covered with horn sheaths forming beaks. They produce their young from eggs. Living birds are known by over thirteen thousand species, divided into over one hundred and fifty families.

Biologists have established that birds are derived from

reptilian stock. They base it on their (birds') egg laying habits, combined with numerous structural features shared by birds and the geologically much older reptiles. Apart from their egg-laying habits, birds show reptilian affinities in the general structure and particularly that of the eye and heart. Mentally, birds are midway between mammals and reptiles. They can improve their intelligence by contact with man.

Their faculty of flight is due not only to the indispensable wings but also to other modifications. They have hollow bones which can be filled with air from the lungs. The speed of flight of birds varies with their development which differs vastly according to habits, some birds very rarely resort to flight: while others spend most of their wakeful day on the wings. Some birds are entirely aquatic (living or growing in water) in habits.

Feathers, apparently so unique, are in reality a natural development of scales, split into innumerable fine strips which interlock, giving great strength and air resistance combined with the minimum weight. They also help to return body heat even more than fur does. The birds are thus enabled to endure the extreme cold met with when swimming and flying at high altitudes. Cold is further withstood by the high body temperature which may attain to 112°F. The feathers are renewed once or twice a year by moulting. Birds are protected from enemies by colouring of plumage which often matches surroundings. Males usually have more brilliant plumage than females. Plumage is generally more colourful during mating seasons.

Birds are found in every part of the earth even within appreciable distances of the poles or in the centre of waterless deserts. Most of the birds are migratory, and cover long distances in their flights.

Birds reproduce by laying eggs in nests which they build on trees or on the ground, of various materials; sticks, bark, string, grass, leaves, moss, hair or mud.

The songs of most birds are charming, especially those of warblers or thrushes, at the height of charm in the mating seasons. The food of many birds consists mainly of seeds and vegetable matter, insects and worms, eagles and hawks

prey on small mammals, fish and other birds, vultures on vertebrate animals.

3. **Reptiles.** The reptile group includes the tortoises, turtles, crocodiles, alligators, gharials, lizards and snakes. Modern reptiles are cold-blooded vertebrate animals not provided with hair or feathers.

In defining reptiles as cold-blooded animals it is not meant to infer that their temperature is always very low, but that their blood rises and falls according to the temperature of their surroundings and is more or less constant as in the mammals and birds. They always breathe by means of lungs and do not undergo in their early stages a transformation from gill-breathing to lung-breathing creature. The skull is articulated with the first vertebra by means of a single-ringed knob or condyle, a feature which the reptiles share with the birds thus differing from the mammals and amphibians in which it is attached by two knobs. Many of the reptiles lay eggs, but some species bear the young. The reptiles are said to have ruled the world at one time. In the remote past they were the preponderating type of vertebrate animals.

4. **Amphibians.** The amphibian group includes the frogs, toads and salamanders. It is relatively small group of vertebrates. All of its members are cold-blooded and have three-chambered hearts. The early days of most amphibians are spent in water, and only a few are entirely independent of water in the adult stage. Zoologically the group stands midway between the reptiles and fishes. Many amphibians are distinctly reptilian in general shape, and all, like fishes, are gilled, at least in the larval stage. They differ from reptiles in the skull, articulating by means of two condyles instead of one.

5. **Fishes** of which about twenty thousand living species are recognised, represent the vertebrate form in its simplest terms. They are cold-blooded, aquatic and gill-breathing animals. The most distinctive feature of fishes lies in the fins. Fins are of two well-defined types—median fins and paired fins, the latter foreshadowing the articulated limbs of the amphibians, which in their turn give rise to the birds' wings

and the highly specialised arms and legs of the higher mammalia. Median fins may be situated on either the back or belly of a fish, and are generally present in both situations. Their function is chiefly to preserve the creatures' equilibrium, as does the centre board of sailing vessel, but sometimes they are highly mobile and provide the motive power, as in the familiar sea-horse and pipe fish. Paired fins are placed near either extremity, and not only provide motive power of a swimming kind but can also serve as hands whereby to walk and even climb. The bulk of the propulsion, however, is provided by the fish forward over ground, above or below water.

Fishes, with a few exceptions, are unable to live long out of water. A few, like the salmon, migrate from the sea to fresh water to breed, whereas the eel descends from river to the sea for that purpose. Most of them lay eggs which are fertilized after decomposition and many number millions as, for example, in the cod. In some, like the sharks, the eggs are fertilized internally, and the young are developed for seven or more months within the mother before being laid in a large leathery egg-case. A few sharks and rays are even viviparous, and in these cases are few in number.

No animals surpass the fishes in brilliance and variety of colour and pattern. They can contract and expand. And under the incidence of light acting through the eyes on the nervous system, many fishes can change their colours often with great rapidity to harmonize with that of their surroundings. Deep-sea fishes are generally uniformly black or brown, and possess phosphorescent organs of various kinds, particularly to illuminate the darkness of the depth in which they live and partly in those species in which they are developed at the end of long antenniform processes on the head, to act as a bait for prey.

Fishes have no true lungs. As such, it can be reasonably supposed that they are voiceless. But great many fishes are known to be able to emit sounds. Apparently they are produced by the contraction of the air-bladder.

Fishes feed upon the water animals. They catch them in the open water or find amongst the rocks, sand or mud, or secure by lying quietly in wait at the bottom.

6. **Cephalochordata** (Lancelet). The common lancelet is a semi-transparent, leaf-shaped animal about two inches long. It is found in the North Atlantic and Mediterranean. It lives half-buried in the sand and it gathers food in its interior by means of a ring of lashing hair surrounding its gill-slits. The animal can swim in an eel-like manner, but usually lies obliquely on its back, with only the mouth appearing above the sand. Allied forms are found the world over.

7. **The Tunicata (Tunicates or Sea Squirts)** are world-wide marine animals, presenting an infinite variety or structure, yet all possessing certain features in common. The body is enclosed in a gelatinous sheath or tunic, having two openings leading into the interior. The one takes in food and sea-water by means of lashing hair, the other ejects waste matter. The circulatory system is unique in that the heart beats in one direction for a short period, and after a pause, pumps the blood in an opposite course. On being touched the animal usually contracts, ejecting a steam of sea-water. Most sea squirts are anchored for life to rocks, weeds, etc. Some may be large, single individuals, others form colonies of animals united into an encrusting mass.

The Hemichordata (the worm-like Balanoglossus) are represented by a number of worm-like animals.

The Lancelets, Tunicates and Homichordates are now placed in a half-way division between the backboned and invertebrate animals, because they show certain characteristics both vertebrates and invertebrates.

Invertebrates. The invertebrate animals, as understood today, are all those forms of life which have no hard, articulate internal skeleton. As amongst the various groups of vertebrates, each of the main groups is linked to the others by intermediary forms. The invertebrate animals, however, are not so sharply defined as are the vertebrates. All worms, for example, cannot be identified as easily as a bird can be distinguished from a mammal or a reptile. Until within relatively recent times naturalists often confused the various groups, and even today the precise position of many invertebrate animals is a matter for confusion.

Mimicry (*swang, naql*) is the likeness a harmless or edible animal bears to a harmful or inedible animal. The resemblance gives the defenceless and edible species of animals the advantage of shelter, because their enemies are deceived by their superficial resemblance to those who are harmful or distasteful. Usually, mimicry occurs between animals who are structurally similar and are, therefore, related to one another. Sometimes mimicry also exists between species totally unrelated. Mimicking species imitate size, shape, colour and behaviour of their models.

Mimicry is found most widely in the insect world. Leaf-insects match in shape and colour to the surrounding foliage and stick-insects to twigs.

Many classes of animals are mimics as, for examples, wasps, bees and ants are disliked by most birds because of their stings and acid taste. The honey-bee is safe from a large number of insect enemies, because it stings and is distasteful. The drone-fly has no stings and is as far as known quite edible. But the insect-eating birds associate distastefulness with the size, colour and form of the bees and so leave aside the drone fly also.

The Indian cuckoo resembles the fierce and powerful drongo-shrike. The resemblance enables the female cuckoo to lay her eggs in the nests of the drongo to be hatched. A kind of small bush dog in South America resembles the weasel-like tyra—an animal protected by its ferocity and stick glands, and consequently the pumas, jaguars, etc., leave it aside.

As birds discriminate between insects by sight, bees and wasps are nearly always conspicuously coloured, generally black and yellow. Wasps and skunks instinctively avoid attack by courting observation, so that possible enemies are warded off.

Fauna

Aardwolf—a wild animal, resembles the hyena, has a grey coat striped with black and a bushy tail; feeds on ants and carrion. It is found in South America.

Addax—an antelope in deserts of Arabia and North Africa.

Agouti—a rodant-like rabbit, found in South Africa and West Indies.

Albatross—a large sea-bird, characterized by three-toed, webbed feet and strong hooked beak; noted for its graceful soaring flight; often found miles away from the land in the South Sea.

Alligators—a family of reptiles akin to crocodiles; inhabit the banks of rivers, spending much of their time in the water, preying on birds, small mammals and fish skin; have commercial value; found in the Mississippi; lay their eggs on the banks.

Alpaca—a domesticated breed of Llama, found in Peru, Bolivia and Chile (South America); bred for its luxuriant woolly fleece, which is mainly black to dark brown, lustrous, silky and fine.

Antelope—(*haran-ki-qism*) hollow-horned, hoofed mammal of *Bovidoe* family, differing from the goat in its beardless chin; remarkable for its lustrous eyes, agility and swiftness, excellent leather made of antelope skins, flesh highly palatable; found in Africa, Arabia, Syria, America and Asia.

Apteryx—(Kiwi) a bird in New Zealand.

Arachnida—a class of arthropode; spiders, scorpions, etc.

Armadillo—toothless, mail-clad, burrowing mammal of South America, has an outer covering of small bony, rounded plates, protecting its head, back, legs, tail against an attack, rolls itself into a ball.

Asp—poisonous snake of the viper family, native to South Europe especially Alps; name also applied to the Egyptian cobra and other poisonous North African snakes.

Auk—several species of swimming and diving birds, especially the great and little auk; native to North Atlantic and Pacific; their legs are set far back on their bodies, they are awkward on land where they can only make nests.

Aye-aye—an animal, about the size of a cat, having a very bushy tail and monkey-like paws and long and thin middle finger, found only in Madagascar.

Babirusa—an animal of the pig family, has long legs; its upper teeth grow through the skin of the face and then turn backwards over the forehead.

Baboon—a monkey found in Africa and Arabia, has a short tail and large head, having its arms and legs of equal length. It is large and fierce.

Badger—carnivorous animal found in Great Britain and various parts of Europe and in China. Its hair are used for brushes.

Bandicoot—an animal carries its young in a pouch, has a pointed nose. It is of approximately the same size as a rabbit. It is found in Australia.

Beluga—white whale of creamy white colour; from 12 to 16 ft. long, found round Greenland in the Arctic Sea and the Gulf of St. Lawrence and occasionally off the north coast of Britain.

Bison—a kind of wild cattle of two species, the European and the American, characterized by massive shaggy head and high shoulders with small hind-quarters, used to range the plains of North America in great herds, feeding on grass and bush species, have suffered almost complete annihilation, because of their use in providing food and clothing for man.

Blackbird—name of several large-sized migratory birds with prevailing black plumage. In English literature used as song-bird of Britain. They nest in bushes and trees in marshy ground except the cowbird, gather in flocks, feed chiefly on insects and vegetable matter.

Canary—a bird, native of the Canary Islands, Maderia and the Azores; widely domesticated in Europe and Africa. The finest singers come from the Hertz Mountains

(Germany) where they are carefully trained.

Caribou—a kind of reindeer found in Canada and Greenland Eskimos and Red Indians hunt them for clothing and food.

Centipede (*kankhojura*)—a poisonous insect with a large number of legs (*centi*, one hundred; *pede*, legs). It is nocturnal, hiding under stones and wood in the daytime. It is found in houses and in gardens.

Chamois—a kind of antelope remarkable for its jumping power: found in Alps Mountains, Europe and Asia Minor.

Chimpanzee—an ape, the most manlike of all the animals, a native of tropical West Africa, of a dark-brown colour, with arms reaching the knees and large ears.

Chow-Chow—domestic dog; native of China; distinguished by tail curling over back; black tongue. Colours are: red, black, brown, white-red is the most common.

Crab (*kekra*)—a well-known shell-fish. It has a short tail and five pairs of legs. There are land and fresh-water crabs, but most crabs exist in salt-water.

Cony—a kind of rabbit in cleft of rocks in Palestine.

Codo—an extinct flightless pigeon of Mauritius; supposed to have been exterminated around 1681 by hogs.

Dolphin—a small gregarious whale, a mammal usually 6 to 8 ft. long, slender, common in Atlantic and Mediterranean.

Duck-Bill—a small egg-laying mammal; has characteristics of both reptile and bird; found in Australia and Tasmania.

Dromedary—One-humped camel, bred for riding in Arabia. It is much faster than ordinary camel, with average speed of nine miles per hour for many hours.

Elk—a large stage of the deer family, found in Northern Europe, America and Siberia.

Emu—is a large ostrich-like bird found in Australia.

Ermine—is a fur animal found in Asia.

Falcon (*baaz*)—a species of hawk, a bold bird of prey. Peregrine falcon is found in North America.

Flying fish—is a name for several species of bony fishes in which pectoral fins are lengthened and wing-like and serve to sustain the fish in short flights through the air.

Flying squirrel—is about 10 inches long, with an extensible natural parachute for gliding made of a broad skin-fold or membrane along the body wall outstretched between fore and hind feet when these are extended. Found in Europe, Africa, Asia, North America, especially in colder parts.

Flying fox—is a kind of fruit-eating bat.

Gazzelle (*haran, mirg*)—small antelope, fawn-coloured, some have twisted horns, found in Asia and Africa.

Gibbon—is a kind of ape; has a slender body and powerful limbs; extreme agility enables it to move about in trees with great speed, native to South-East Asia and East Indies.

Giraffe—the tallest of all animals; attains a height of 18 to 19 feet; has a short body, short horns but has exceedingly long legs and neck. It is a native of Africa—south of the Sahara.

Gnu—is a large antelope of Africa, characterized by bushy tail and horns bent downward close to the head with the points turning up.

Gorilla—largest of the man-like apes, is comparatively inoffensive and only attacks man in self-defence, native of Equatorial Africa.

Hamadryad—king cobra; a deadly snake; feeds on other snakes; found in Bharat.

Hippopotamus (*daryai ghora*)—is a river horse, a large aquatic mammal; spends the greater part of the day submerged in water with its eyes, ears and nostrils above the surface (or lying on the shady banks of the river); now found only in Tropical Africa.

Ibex—gregarious (living in flocks and herds) wild goat distinguished by long curved hours of male which inhabits snow-line of mountain ranges of Asia, Europe and Africa.

Jaguar—the most ferocious member of the cat family found in North and South America.

Kangaroo—is a large pouched bearing mammal found in Australia and in the adjacent islands; has short and weak forelegs but strong hind-legs and a long muscular tail.

Kingbird—is a tyrant fly-catcher found throughout the United States, Canada; about 8 inches long, very bold, attacks birds larger than itself when its nest is disturbed.

Kiwi—a bird of New Zealand.

Koodoo or *Kudu*—one of the largest and handsomest of the African antelopes, only males have horns long and spirally twisted.

Lemur—monkey-like mammal of Madagascar and the Comoron Islands. It is noted for its strong plain toes enabling it to use its feet as hands and also well-developed thumbs on the hands. It lives in trees and sleeps during the day-time.

Leopard—carnivorous mammal of the cat family found in Africa and Asia.

Llama—is a species of camel found in South America, mostly in the Andes: differs from camel in having long pointed ears, narrow feet adapted for hill-climbing, and no hump. The male is utilized as a beast of burden while the female provides milk and flesh.

Lynx—is a carnivorous animal, a fairly large wild cat, has a sturdy build with tufted ears and spotted fur, is very fierce, found in Asia, Europe and North America.

Macaw—"Incorrigible screamer," a parrot found in South America.

Mandril—is a large ferocious baboon; a native of West Africa.

Musk Ox—large ruminant mammal of Arctic North America, has ox-like body and long woolly brown coat, short legs and curved horns, is favourite food of Eskimos in remote Greenland.

Muskrat—a beaver, an excellent swimmer, found in North America.

Myna—a talking bird, native of Indo-Pakistan subcontinent.

Ocelot—leopard cat, found in America.

Okapi—the only living representative of the giraffe family except the giraffe. Okapi lives in couples in the Congo forest and feeds on foliage.

Ostrich—two-toed, flightless bird, the largest known bird, its wings are not capable of flight but add considerably to the speed of the bird, which can outstrip most horses, the neck and legs are naked, highly valued for the rich feathers grown on its wings and tail; found in Africa and South-West Asia; also reared in Argentina, California and elsewhere.

Panther—carnivorous mammal of the cat family akin to the leopard; found in India and other parts of Asia, also in Africa.

Penguin—a flightless sea-bird found in Antarctic regions.

Penzitun—sea fowl of southern hemisphere.

Polecate—carnivorous mammal of the weasel family, of dark-brown colour, bushy tail, small, rounded ears with white marks round the head; is found in Britain.

Ratel—carnivorous animal of the badger family, inhabiting India and Africa; has short limbs and short tail, and has the lower part of the body black and upper part iron-grey.

Reindeer—genus of deer, horned in both sexes. It is brownish-grey, with white face and neck, has an average height of 4 feet, and 6 inches and is very swift-footed; found in Tundras or Russia, Siberia and North America.

Roller—genus of birds remarkable for the brilliant plumage, takes its name from its habit of rolling over in the air like the tumbler pigeon, found in Asia and Africa.

Ruminant—type of mammals that chew the cud having a compartmental stomach, enabling them to swallow food and later to bring it back to the mouth for mastication, *e.g.*, sheep, goat, deer, ox, etc.

Tse-tse fly—blood-sucking fly of tropical Africa.

Walrus—large marine mammal having a round head, small eyes and heavy body characterized by having in the

upper jaw two large curved tusks which average in length from 15 inches to 2 feet; found in the North Polar regions.

Wapiti—large deer with great brown-tinted horns, found in North America, its hide makes excellent leather.

Battle Bird—is a bird with fleshy appendage on head found only in Australia.

Wryneck—bird of woodpecker family, derives its name from its curious habit of twising its neck about in feeding, has pretty grey plumage.

Yak—long-haired ox, found in Tibet and neighbouring regions; kept for its milk and flesh and used as a beast of burden; a heavy bulky animal with short legs and long, shaggy hair.

Zebra—is an African quadruped of whitish-grey colour with regular black striping, larger than an ass and smaller than a horse, has a tufted tail.

Zebu (*Sanda*)—humped ox, found in Indo-Pakistan sub-continent and other parts of Asia, regarded as sacred by Brahmins.

Animal Records

Fastest Animal	..	Cheeta.
Fastest Bird	..	Swift (flies about 200 miles per hour).
Largest animal of cat family	..	Lion.
Largest land animal	..	Elephant.
Largest of man-like apes	..	Gorilla.
Largest sea animal	..	Blue Whale.
Largest of sea-birds	..	Albatross.
Longest lived creature	..	Blue Whale (500 years).
Largest neck	..	Giraffe.
Smallest bird	..	Humming bird.
Tallest animal	..	Giraffe.

Average Life of Animals

Animal	Years	Animal	Years
Ant	1	Cow	15
Bear	50	Dog	12
Camel	50	Eagle	30
Crocodile	300-400	Elephant	100
Cat	15	Goat	15
Goose	25-50	Rabbit	8
Horse	50	Sheep	12
Lion	70	Snake	10
Mouse	2-3	Tiger	15-20
Monkey	35	Tortoise	120
Owl	6-8	Whale	500

Average Life of Birds

Bird	Years	Bird	Years
Crow	100	Peacock	24
Hen	14	Sparrow	40
Nightingale	18	Stork	70
Parrot	100	Vulture	100

Average Life of Man

Country	Male (years)	Female (Years)	Country	Male (Years)	Female (Years)
U.S.A.	61.00	65.00	Norway	61.00	64.00
England	60.18	64.40	Russia	42.60	49.00
Austria	63.48	67.14	Pakistan	35.20	32.00
France	54.00	59.00	Switzer-land	60.00	63.00
Germany	60.00	63.00	Bharat	27.00	26.00
Italy	54.00	56.00	China	35.00	34.00
			South Africa (White)	60.00	64.00

Chapter 4

HUMAN BODY

The body of man is the most perfect machine in the world. Those who know the working of man-made machine can better appreciate the technique and working of human body—a God-made machine. Since the very early times man has marvelled at the complexity and perfection of this machine, and the wonder grows none the less by the discoveries of more recent times. On the other hand with every advance in the investigation of its anatomical structure and physiological function more and more artful skill in its creation is revealed.

The elemental constituents that go to make the body are commonplace and are found everywhere. Protoplasm, the physical basis of all life, is the fountain source of vital organisms here as elsewhere, and its constituents are the ordinary elements; oxygen, nitrogen, carbon, hydrogen, phosphorus and some salts. These are found in abundance in nature.

The protoplasm in human body does not exist in freely flowing fluid state. It is contained in the form of packages or cells (a cell is unit mass of living matter), millions upon millions which are found in a body. Different families of cells have different functions to perform, and their differentiation proceeds from the very day a human being begins to develop in a woman. The hair, the skin, the marrow of the bones, the grey matter of the brain, etc., are constituted by cells, each indistinguishable from the other in its structure and functions, although not strictly in chemical composition. When these cells multiply, the organism as a whole (body) grows.

The Framework. Bones joined together to form the skeleton, give the human body its distinctive shape. The skeleton provides the necessary support and protection for the soft parts of the body and gives points of attachment for the

muscles which make possible all movements such as walking, chewing and writing.

The Skull. The bones of the skull are arranged in two groups, those of the brain case (*Cranium*) and those of the face.

The brain is housed in the Cranium, upper part of the skull. The Cranium is composed of eight immovable interlocking bones. The lower part of the skull is made up of fourteen bones of the face. These also are immovable except for the lower jaw, which has hinged joints allowing it to move up and down. The cavities of the nose and eye sockets (orbits) are formed by the bones of the Cranium and of the face conjointly. The mouth cavity is formed between the upper and lower jaws, the palate being the bony roof of the mouth which separates it from the nasal cavity above.

The Trunk. The bony framework of the trunk is made up of the backbone at the rear, the ribs at the sides, the breast-bone in front and the pelvis below. The cavity of the trunk is divided by a thin, dome-shaped partition of muscle called the *diaphragm*. Above the diaphragm is the chest cavity occupied by the heart and lungs. Below it is the abdominal cavity containing the stomach, liver, spleen, pancreas, intestines, kidney and the pelvis organs.

The Spinal Column. The backbone is made up of a number of irregularly shaped bones called *vertebrae*. Each consists of a bony mass in front, from the sides of which processes extend backwards and unite to form the spinal canal, which encloses the spinal cord.

The Vertebrae are 33 in all, grouped as follows:—

(*i*) In the neck 7 *Cervical Vertebrae*. The first vertebra (*Atlas*) forms a joint with the base of the skull, on which the nodding movements of the head take place; the second (*Axis*) by means of the joint between it and the Atlas, permits the side-to-side movements of the head.

(*ii*) In the back, there are 12 *Thoracic* vertebrae, to which the ribs are attached.

(*iii*) In the loin 5 are *Lumbar* vertebrae.

(*iv*) There are 5 *Sacral* vertebrae united in adults as a solid mass in the rump-bone (*Sacrum*).

(*v*) The tail-bone (*Coccyx*) consists of 4 vertebrae joined together.

Between the bodies of the vertebrae, in the upper three regions, are interposed thick pieces of gristle (*Cartilage*) which allow of a free movement to the column as a whole and help to break the shock of any sudden force applied to the spine (for example, when falling on the feet from a height).

The Breast-bone and the Ribs. The breast-bone (*Sternum*) is a flat, narrow bone about six inches long, situated in the middle of the chest. The two collar-bones are fastened in front to the top of the breast-bone, and the seven upper pairs of ribs fit into notches down each side. These seven pairs are called "*true*" ribs. The lower five pairs of ribs are called "*false*". Of these, the upper three pairs are attached by cartilage to the ribs immediately above them. The last two pairs are unattached in front and are called "*floating*". The cage-like arrangement of the chest is an admirable compromise between stability and mobility. The ribs enclose the chest and serve to protect the lungs, heart, liver, stomach, spleen etc.—the most important organs of human body.

The Shoulder-bones are the collar-bone (*Clavicle*) and shoulder-blade (*capula*).

The Collar-bone. It is on either side beneath the skin at the lower and front of the neck as a narrow curved rod. Its inner end is attached to the upper part of the breast-bone and its outer end joins with the shoulder-blade.

The Shoulder-blade lies at the upper and outer part of the chest, and forms joints with the collar-blade and the bone of the arm.

The Arm-bones (*Humerus*) reaches from the shoulder to the elbow.

The Forearm consists of two bones, one on the thumb or outer side called *Radius* and the other on the little finger or inner side called *Ulna*. Both bones reach from the elbow to the wrist and change their relative position with every turn of the hand.

The Hand consists of:—

(*i*) The bones of the (*Carpus*) eight in number, arranged in two rows of four.

(*ii*) The palm (*Metacarpus*) is composed of five bones which form knuckles and support the bones of the fingers.

(*iii*) The finger bones (*Phalanges*) are three in each finger and two in the thumb.

The Pelvis and Lower Limbs.

The Pelvis. The large basin-like mass of bone attached to the lower part of the spine is called the *Pelvis*. It is composed of four bones—the two hip-bones, at the sides and front and the sacrum and coccyx completing it behind. The hip-bones are irregularly shaped bones resembling nothing and hence are called *innominate* or nameless. The pelvis supports the abdomen and its contents, and provides deep sockets for the hip-joints. Fracture of the pelvis is a serious injury, principally because of the danger of puncturing the bladder.

The Thigh-bone (*Femur*) reaches from the hip to the knee-joint. It is stout, rounded and arched forward; the upper end presents a rounded head, supported on a neck which projects inwards, to fit into the socket of the hunch-bone, the lower end broadens and enters into the formation of the knee-cap.

The Knee-cap (*Patella*) is a flat triangular bone lying with its base upwards in front of the knee-joint beneath the skin.

The Bones of the Leg. There are two bones in the leg just like the fore-arm, the *Shin-bone* (*Tibia*) and the *Brooch-bone* (*Fibula*). The shin-bone extends from the knee to the ankle, in both of which joints, it plays an important part. Its sharp edge can be felt immediately beneath the skin of the front of the leg. The Brooch-bone lies on the outer side of the tibia. It does not form the knee-joint, but its lower end forms the outer part of the ankle-joint.

The Foot comprises of:—

(*i*) A group of seven irregular bone (*Tarsus*) at the

instep. The largest is the heel-bone and the uppermost (the ankle-bone) forms the lower part of the ankle-joint.

(*ii*) The five long bones (*Metatarsus*) which support the toes are in front of the tarsus.

(*iii*) The toe-bones (*Phalanges*), two in the big toe and three in each of the other toes.

Joints and Ligaments. A joint is the meeting place of two or more bones. Some bones that are needed only for protection, like the bones of the cranium, are immovable at the joint. In the movable joints, strong white bands, or fibres, called *ligaments*, extend over the joint or completely surround it. The articulating, or jointing surface of bones are clothed with smooth, tough cartilage. The cartilage in turn is lined with a thin membrane which secretes a thick fluid like the white of an egg. The fluid oils the joint so that in moving, the bones rub against each other without friction of cracking. When a joint is wrenched or twisted so that the ligaments are stretched or torn, a sprain is the result. If in addition to sprain the bone is pulled out of the place, the injury is called a dislocation.

Kinds of Joints:—

1. **Ball and Socket Joints** are those in which the rounded head of one bone fits into a cup-shaped cavity formed by the other bone, such as the *shoulder* and the *hip*. In this type of joints very free movement is allowed and they are frequently dislocated.

2. **Hinge Joints** are those in which the surface of the bones is moulded to each other in such a way as to permit only bending (flexion) and straightening (extension) such as elbow, knee and ankle. Considerable force is necessary in this type of joints to cause a dislocation.

The Muscles (red flesh) are of two kinds:—voluntary and involuntary.

The Voluntary Muscles are attached to the bones either directly or by strong bands of white tissue (*tendons*), and have the power of contracting, *i.e.*, getting shorter and thicker. They cause all the movements of the body and limbs, and are

controlled by the brain, which sends messages (*impulses*) through the nerves to any muscle or group of muscles which is to be put into action. In this way movements such as walking, eating, swallowing, lifting anything, etc. are performed.

The Involuntary Muscles are met with in the walls of the stomach and intestines, in the air passages and most of the internal organs and blood vessels. These are not subject to the will but contract without conscious control or intention. They cause motion in the walls of the blood vessels and in the visceras—*i.e.*, the heart, stomach and other organs within the body cavities.

Connective Tissue consists of elastic and white fibrous tissue intermixed in varying proportions. It is present in many parts of the body and forms a layer between the skin and underlying flesh all over the body, fat being contained between its nerves, often in large quantities. The chief use of the connective tissue is that it binds parts together.

The Skin covers the whole of the body and protects the underlying structures. It consists of two layers, the outer and hard layer (*cuticle*) and the inner layer (true skin or *dermis*). In the latter are numerous glands which secrete *sweat:* they consist of water and impurities of blood, the evaporation of which from the surface of the skin cools and helps to regulate the temperature of the body. Sweat increases during summers. Sweating may be due to heat, mental work or muscular exercise. Sweat keeps the skin moist, maintains water balance and drives out excretory products.

Kidneys are important organs of excretory system in our bodies. Excretion is the process of elimination of waste and harmful products of the body. The organs of excretion are skin, alimentary canal, kidneys and lungs.

Kidneys are two and are situated in the abdomen, one on each side of mid line. From inner aspect of each kidney emerges a tube called ureter. Ureter conveys the urine formed in the kidney to urinary bladder, from where it passes out by a narrow tube called urethra. Kidney performs many functions *viz.* excretion of urine, maintenance of blood reaction, water balance and concentration of blood.

Kidneys are regarded as the most important organs of excretion because they eliminate urine which contains toxic substances.

The excretary products are formed in different parts of the body. Blood carries them to kidneys where filtration takes place. Useful substances are reabsorbed. In the end a liquid containing toxic substances is obtained which is called *urine*.

Blood is a complex chemical fluid with red corpuscles through which the body is supplied with iron and oxygen. The white corpuscles are the defence force of the body. They destroy dead tissues and ward off disease. They are active in disease. The pump action of the heart circulates the blood throughout the body by the arteries to the tissues and from the tissues by the veins. Blood solidifies when exposed to the air, splitting up into a red clot (*dala*) and a clear yellowish fluid called *serum*.

Blood-pressure is the pressure of the blood on the walls of blood vessels. It is the tension within the blood vessels. It can be measured by an instrument called a sphygmomanometer. Blood pressure is necessary for health as well as for life. It varies at different points of the body. This difference makes the blood circulate through the body which is essential for life. Blood pressure is highest during the contraction (*systole*) of the heart. This highest pressure is called the systolic blood pressure. It is lowest during the time the heart is in relaxation (*diastole*). The lowest pressure is called the diastolic pressure.

Usually blood pressure increases with age. Low blood pressure occurs in debilitating diseases and it produces a feeling of great general weakness. High blood pressure may be produced by kidney disease or by poisons absorbed into the body.

Heart and the Circulation of Blood. Blood circulates through the body in a vast system of enclosed tubes—the blood vessels. The pump which keeps the blood in motion is the heart, which is a hollow, conical and muscular organ situated just behind the chest wall, slightly to the left side. This pump is divided down the middle into two compartments,

a right and a left. Each of these compartments is in turn divided into two chambers, with a trap door or valve between. The upper chambers are called *Auricles*, the lower ones *Ventricles*. At each beat of the heart, blood is pumped from the right ventricle to the lungs and from the left ventricle to all the rest of the body. At each relaxation of the heart, blood flows into the right auricle from all the rest of the body and into the left auricle from the lungs. The reason for this arrangement is that blood after its journey through the body is rich in carbon dioxide and poor in oxygen. Thus it must be sent to the lungs to unload carbon dioxide and take on oxygen before starting on another round trip.

The vessels which carry blood away from the heart are the *Arteries*. The big trunk artery of general circulation, the *Aorta*, springs directly from the left ventricle and then subdivides into innumerable branches leading to all parts of the body except the lungs. The arteries end in network of exceedingly small tubes finer than any hair, called the *Capillaries*.

The blood vessels which carry impure blood back to the heart are the *Veins*. Beginning as tiny tubes leading out of the capillary networks in the tissues, the veins of the general circulation merge to form increasingly larger vessels until finally they end in the two large veins through which the blood flows into the right auricle of the heart.

Each time the heart beats, the load of blood pumped into the stream of blood already in the arteries starts a distending wave which may be felt at the base of the thumb as a "*pulse*". The rate at which heart beats is known as *heart rate* or pulse rate. *The pulse rate for the normal adult is about seventy-two beats per minute*, while a baby's heart beats about 120 times a minute. The fact that the blood moves through the arteries in waves accounts for the spurting of blood from a cut artery. By the time the blood reaches the veins, its pulsating rush has been spent. Thus the blood from a cut vein flows out in a steady stream.

The Digestive System is concerned with the breaking up of food from complex to simpler forms, in which it can be absorbed. It consists of a very long tube known as the *alimentary canal* extending with convulsions about 30 feet

from the mouth to the anus. The digestive canal is divided into many parts *viz.*, mouth, phyrynx, oesophagus, stomach, small intestines, large intestines, rectum and anal canal in serial order. The processes of digestion begin at the receiving orifice or the mouth and continue right through the stomach and intestines till the assimilable food has been extracted and the faeces is then ready to be thrown out.

The food, chewed well, moistened throughout by saliva (*luab*) which digests the starch (*nishasta*), is shaped and steered with the help of the tongue and swallowed through the gullet (*halq*) to the stomach. Here the muscular walls churn (agitate) it with wave-like motion, mixing it with gastric juice.

The stomach itself absorbs almost no substances; alcohol is one of the few absorbed there. After three or four hours, the food passes through the pylorus (an opening which by contraction has retained the food in stomach until ready) onward into the small part of the intestine, where the pancreatic juice and bile make it milky-looking and alkaline. These juices act on fats, starches and sugars. Secretions of the mucous intestinal lining act on proteins and sugars.

In the small intestine, the newly-prepared food products are taken up by the blood vessels and lymphatics, being thus admitted to the general circulation. The red blood corpuscles receive peptones distributing them all over the body as globulins. Other peptones and nearly all sugars are packed away into the liver as glycogen to be drawn upon as needed. The large intestine takes up the food material. Through the intestine the debris passes to final discharge through the rectum.

Vomiting is the act of forceful expulsion of stomach contents through mouth. It occurs as a result of irritation in the stomach. Vomiting helps in forcing the irritants out of the stomach.

The Lungs and Respiration. Blood must be plentifully supplied with oxygen and, at the same time, it must be efficiently divested of its excessive carbon dioxide content. The mechanism through which this is done is known as the organs of respiration, the lungs. Intake of oxygen and expulsion of carbon dioxide is called *breathing* and coupled with chemical

reaction obtained by burning the organic substances is known as *respiration.* The rate of respiration of an adult is about 18 per minute.

The blood is brought into direct contact with the inspired air in the lungs. After the interchange has taken place, the purer blood is pumped back by the heart to be conveyed to the various parts of the body, while the extracted impurities are blown out with the out-going air.

The air drawn in through the nose undergoes a process of warming up and of moistening in the nostrils and *en route* to the lungs. Any harmful germs also, which may have been inhaled in the air, are trapped and killed by the sticky fluid mucus secreted in the nasal passages. The wind-pipe carrying the air divides into two branches: one goes into the right lung and the other goes into the left lung. They further subdivide into smaller and smaller tubes till they become microscopically small.

The Nervous System controls the complex mechanism of human body. The system is more perfect than any telegraphic system that can be devised.

Messages of at least five different kinds: sight, smell, taste, hearing and touch, all travel to the brain *via* sensory nerves. The brain then discriminates between the various kinds of messages, and decides upon approximate action which is accomplished by means of messages sent from brain to other parts of the body *via* nerves.

The nervous system consists of chains of nerve cells, and their processes, supported by other cells called *ñeuralgia.* The nerve cells are of various, often irregular, shapes. From the cells bodies radiate filamentous processes of microscopic dimensions. Some of those processes are short, while others may be a yard in length. These processes are short, while others join up with one another to form links between various nerve cells or they go to the skin muscles or glands in other parts of the body.

The nervous system as a whole consists of two parts and each part is itself again subdivided as follows:

1. The central nervous system consists of: (*a*) the brain, (*b*) the spinal cord, (*c*) the various nerves spread all over the

body. By means of these, impressions are received from the outside world and the working of all the organs are controlled.

2. The peripheral (or *lower*) nervous system which consists of: (*a*) the *cranial nerves* which leave the under-surface of the brain and passes out of the skull through some apertures. These include nerves which deal with sensations of smell, sight and hearing and movements of the eye and of the muscles of the face; (*b*) the *spinal nerves* which leave the spinal cord and emerge through apertures in the spinal column and which convey messages between the brain and the skin and muscles; (*c*) *sympathetic nerves*: nerves, which lie in front of the backbone, and on each side of the spinal cord from which later they receive communications. The *involuntary muscles* are those muscles which are not under the control of the will such as those in the walls of small arteries, in the walls of the heart, and in the walls of the intestine.

Thus, the nervous system works in a wonderful way. It acts like an overseer which governs, directs and coordinates the functions of every organ of the body, and keeps it strictly on its work throughout life. The brain is just like the head office receiving messages from the lower offices and sending orders to them. In order that the head office may be left to deal with only what is really important and may not be unnecessarily burdened with work, some responsibility is also delegated to the sub-offices to dispose of certain routine matters without bringing them to the notice of the head office. The more important sub-offices are situated near the head office, while the less important ones are farther away. The messengers which are very efficient are ever-ready to take a message and deliver it in the quickest possible way. The nervous system is a sort of a machine working so perfectly and as a co-ordinated whole.

Glands. Gland (French *glande*—Latin *glans*, *glandis*, an acron) is a secreting structure, which in various ways alters the material brought to it by the blood, extracting and excreting waste products as in the kidneys, or manufacturing valuable by-products, such as the glycogen and bile of the liver glands secrete a substance which is used elsewhere in the body. The secretion is usually conveyed by a channel called *duct*. Important glands possessing ducts

are as follows:—

Liver. It is the largest gland of the body. It is situated in the right and upper part of abdomen. At the lower border of liver is situated a pouch called the *gall-bladder* for storing bile-line manufactures bile, stores carbohydrates as *Glycogen* which acts as a reserve food; manufactures red blood cells in foetal life, stores blood and excretes waste products.

Spleen. A soft, pulpy, blood-modifying gland near the large extremity of the stomach, supposed by the ancients to be the seat of anger and melancholy. This organ is situated in upper part of left side of abdomen. It performs many important functions *viz.* formation of red blood cells in foetal life, storage of blood and destruction of old corpuscles.

Pancreas, a long yellowish gland situated below the stomach secretes a juice known as pancreatic juice which helps digestion of food.

DUCTLESS GLANDS. They do not possess ducts and pour their secretions directly into the blood which carries them to all parts of the body. Secretions of ductless glands are known as hormones which are chemicals in nature and control growth and play an essential part in life processes of the body. If there is any lack or excess of hormones, extraordinary abnormalities in growth and functions of body are caused. There are many ductless glands in the human body. Some important ductless glands are given below.

Pituitary. It is a small oval bilobed body situated at the base of the brain. It is called 'mater gland' because it controls all the other ductless glands. The hormones secreted by pituitary control physical, mental and sexual growth of body. Giantism is caused by excessive production of hormones in childhood. Their deficiency causes dwarfism. Excessive production of hormones in adults causes *acromegaly* on account of which growth of body increases much. *Adrenaes* are two bodies which lie on the upper pole of each kidney. They produce cortin and *Adrenaline.* The former regulates sexual growth and possibly all the functions of the body. If cortin is deficient, a disease called Addison's disease is caused. This disease causes weakness and darkens skin. The excessive secretion of cortin causes abnormal sexual develop-

ment *e.g.*, early sexual maturity, change of sex etc. Adrenaline stimulates heart and regulates blood pressure.

Thyroid Gland. It is comprised of two lobes situated on either sides of windpipe in the neck. It controls the growth of body and mental development. If this hormone is deficient in a child dwarfness called cretinism is caused.

Thymus is situated below thyroid and appears to help sexual and physical growth. The gland disappears in adults. *Islets of Langerhans* are the cluster of cells scattered within the substance of pancreas. Deficiency of insulin—secretion of Islets of Langerhans—leads to diabetes, a disease in which sugar passes with the urine.

Parathyoid. Their secretion regulates calcium of blood and growth of the body.

Sense-organs are specialised to perceive a particular kind of stimulus and to transform it into sensation. Vision, hearing, smell and taste are special organs.

Vision. Eyes perform vision. They are lodged in the eye sockets. The upper and lower eye-lids protect them externally. Tears, the secretion of a special gland lying above the eye-ball, keep eyes moist and protect them externally from dust. The eye-ball is almost spherical in shape. It consists of three layers *viz.* scleroid, choroid, and retina from without inwards. Conjunctiva, a thin transparent membrane, covers front of the eye-ball. Scleriod is continued in front of the eye as a transparent layer and is known as cornea. The portion of choroid hanging downwards like a curtain in front of eye is called Iris. Pupil is the opening between the iris. Behind the iris is lens, a crystalline biconvex mass capable of changing its shape and size. A fluid called aqueous humour occupies the space in front of lens. Retina is composed of rods and cones. Rods are concerned with vision in dim light, whereas cones are sensitive to light and colours.

Hearing is perceived by ear which has three parts *viz.*, outer ear, middle ear and inner ear. The external or outer ear is closed internally by tympanic membrane. It transmits sound waves. On inner side of tympanic membrane is the middle ear which is a cavity filled with air. Three small bones connect tympanic membrane with the inner ear across

the middle ear cavity. They magnify sound waves and transmit them. The inner ear is a closed sac filled with fluid. It is concerned with hearing as well as equilibrium of the body. It possesses nerves which act as a pathway for sensations to brain. The normal range of hearing is 20—25,000 vibrations per second.

Smell. This sense is located in the lining of nasal cavities having nerves which carry smell sensations to brain.

Taste. Taste buds mainly located on the tongue receive taste sensation. The different regions of tongue are sensitive to different tastes as for example tip to sweet, base to bitter, margins to saltish and sour and central part of mixed taste sensations.

CHAPTER 5

SCIENCE OF MIND

(*Psychology*)

Our world contains all sorts of things. There are lifeless things such as rocks, stones, rivers. There are plants and trees which are not lifeless, there are animals and human beings which possess life and mind although of different orders. Lifeless things and plants do not possess mind.

Science. There are three classes of sciences:

1. *Physical Sciences* deal with lifeless matter. They try to understand the various properties of matter. Their composition, the laws according to which these material elements combine and separate and form atoms, molecules, gases, liquids, metals, rocks, sun, planets, etc.

2. *Biological Sciences* deal with life and living things: the conditions and laws according to which plants and animals live and grow.

3. *Mental Sciences* deal with mind and the various functions, applications and products of mind in art, science, religion, society, politics. The fundamental science of mind which seeks to explain the essential nature of mind as it grows and works in human beings and animals is known as *psychology*.

Mind. According to Freud, mind consists of a relatively small conscious part and a larger unconscious part, each of which consists of the process of thinking, feeling and wishing. Mind has the following characteristics:

(*i*) *Unity.* It remains one whole. It does not work as a number of separate processes of faculties such as memory, imagination and thought.

(*ii*) *Immaterial.* Unlike brain, it is not made up of flesh or other matter which can be seen or touched. We cannot perceive it with our senses.

(*iii*) *Active.* It is constantly active.

(*iv*) *Continuous.* Mind is compared to a constantly flowing stream. There is a constant flow of our mental processes one after the other.

(*v*) *Private.* None else but the person himself can observe his thoughts and wishes.

Psychology. (Greek: *psyche* (soul) and *logos* (talk), "talk about soul" or the *science* of soul, as it literally means deals with minds of men and animals). Psychology has been variously defined as the science of soul, the science of mind, the science of consciousness, and the science of behaviour. It is a positive and empirical science dealing with the processes of mind and the behaviour of the body.

Introspection or Internal Observation is a looking within or observing one's own mental processes, as they are going on at the moment, as for example when we are doing something we may look within our mind and see what exactly is passing through it: it is introspection. It is *subjective* method. It gives us a direct and first-hand knowledge of what goes on in our mind. But there are difficulties in introspection. By observing one's single mind he cannot safely *generalize* results. Only capable adults can introspect properly. Children, insane persons and animals cannot do it. External methods are required to be used to observe their behaviour. Introspection cannot explore our subconscious and unconscious processes. Another difficulty is that mental processes always flow and flicker, they are never steady and abiding to allow an observation, as for example the moment one tries to introspect anger it becomes less or even disappears altogether. It amounts to switching on the light quickly to see what darkness looks like. Moreover, the results of one's introspection cannot be verified by another person. Most so-called introspection is actually retrospection *i.e.*, *recalling* a mental process in the mind and then observing it.

External or Objective Observation. Introspection fails in the case of idiots, children, deaf and dumb people and lower animals. It, becomes, therefore, necessary to observe their *behaviour* which consists in observing the outward looks, gestures, sounds, movements and actions of other persons

or animals and inferring their mental processes from these appearances and interpreting them by inferring to our own experience. We interpret other people's behaviour by analogy, in terms of the direct knowledge of our own experiences gained introspectively. As such, the method of external observation depends on introspection.

There are merits of external observation. Firstly, it is through external observation that we can understand and trace the development of mind in animals and children respectively. Secondly, the method is objective and scientific. It is by means of this method that we arrive at general conclusions about all minds through finding certain common forms of behaviour. Thirdly, it has given rise to the testing methods of mind (or mental tests), such as intelligence tests, performance tests, and "special ability" tests. Fourthly, we predict the behaviour of others and control or influence them in the direction they desire. Fifthly, the method of objective observation has made it possible to study the bodily changes that occur in us during intense emotional states like anger, fear, etc., which are now known to have definite effect on the digestive, circulatory and respiratory function.

There are also difficulties in external observation method. We have a tendency to fancy always that other people and animals feel and think in the same way as we do, and interpret their behaviour and judge their mind too much according to the standards of our own, which is not always correct. Besides misinterpreting, sometimes we have difficulties in understanding the behaviour of others *e.g.*, children.

The Genetic (also Development) Method traces the gradual development of a phenomenon by going back to its origin. It traces complicated phenomena back to their simple beginnings, as for example the complicated institutions and ideas found in modern civilized society are traced back to the origins in primitive times.

The Case History (also Clinical) Method—a form of the genetic method, essentially a method used by clinical psychologists or doctors who record all those incidents in the past life of the patient which, he thinks, have some connection with his illness. Thus, he constructs the case history of the

patient. The interview in this regard is becoming popular among psychologists, although there are some drawbacks of untrue statements.

The Statistical Method is concerned with quantitative measurements and the calculation of averages and deviations, so that individual measurements can be evaluated in relation to a form. The method has also been used a good deal in the study of social problems.

The Field Survey Method includes both field investigation and field observation. In the former, we investigate hereditary factors, social conditions, political attitudes, etc., of a group of people, whereas in the latter we observe animals (which also includes man) under natural conditions. In the field survey, we go out and observe phenomena under natural conditions. Valuable experiments have been carried out in schools, on the effects of different sizes of class, different methods of instruction etc., and in factories of supervision, different methods of work, etc.

Branches of Psychology:

General Psychology or Normal Human Adult Psychology studies the mind of a normal grown-up human being. The average man is studied without taking into account the differences among individuals.

Abnormal Psychology is concerned with the study of mental and nervous disorders. The study of the abnormal mind has not only cured mental and nervous abnormalities but has helped to study the normal mind better. In recent years, psychologists have undertaken a very fruitful line of the study of the criminal. It has been found that very often people take to crime not out of choice but because something is wrong with their mind.

Mental Hygiene is concerned with the prevention of mental disease and preservation of mental health.

Psychotherapy is concerned with the treatment and cure of mental and nervous disorders. A psychotherapist has to be consulted when mental hygiene has failed and a person has fallen a victim of some kind of mental disorder. He does not use medicine but suggests methods of healing, such as suggestion, psychoanalysis, hypnotism.

Psychopathology is concerned with the investigation of the various mental and nervous disorders which attack human beings.

Child Psychology studies the child mind, its gradual development and the conditions on which it depends. It solves many practical problems which children present.

Animal Psychology attempts to understand the working and development of mind in the lower animals through the observation of their outward behaviour.

Individual Psychology. Unlike General Psychology, which studies the *general* characteristics of mind, Individual Psychology studies the *peculiar* characteristics of different individuals.

Primitive Psychology studies the beliefs, customs and institutions of primitive people. It has thrown much light on the evolution of religion.

Social Psychology studies the behaviour of the individual in social groups—human societies in which men and women are bound together by kinship, by common political beliefs, by a similar occupation, by common tastes in sports, etc. Man is a social animal. Social factors play a great part in the mental make-up of an individual as it is apparent from a cursory examination of customs, opinions, fashions, manners, morals, etiquettes, religions of people, etc.

A Christian, a Hindu, a Muslim, a Communist, an Arab, a Muslim Leaguer, etc., are all subjects of social psychology.

Physiological Psychology investigates the relation between mind and body. One mind can communicate with others through the medium of the body. It is through the medium of body that mind becomes aware of physical things.

Experimental Psychology is concerned with the study of mental processes and behaviour in laboratories with the help of experiments. As a matter of fact, it is not a separate branch of psychology. Experiment is simply a method which any branch of psychology may employ.

Psychometry measures mental qualities: its most highly branch is intelligence testing.

Applied Psychology studies the practical application of

psychology. The principles of psychology have been applied to education, medicine, industry and law. It has proved to be of great value. The Kindergarten Method, the Montessori Method and the Dalton Method of Education which agree that education should be a matter of joy have psychological background. The researches of psychologists is on learning, retention and memory-training are quite important. The discovery of the possibility of measuring the mental ability of different children, and of discovering what traits are likely to be found together are still more important. Every one of us is born with certain tendencies and hence a mind instead of being an all-rounder is more suited to some one career than to the other. Children, therefore, can be guided suitably.

Psychology can also treat many kinds of diseases, especially mental and nervous diseases. Medical Psychology is today a recognised branch of medical science. Hypnotism, suggestion and psycho-analysis are the chief curative methods.

Applied Psychology also helps us in industry and business Misfits to certain vocations are detected. They are guided, to jobs where they can prove a success. Vocational guidance is an important branch of Industrial Psychology. The various requirements for success in a particular job is analysed as people are examined by means of various tests whether they are fit for a particular job. Occupational misfits are eliminated. This is done by fairly reliable test for measuring individual differences, human abilities and temperament, and traits essential for success in various kinds of work. An employer should also know something of the motives and characteristics of his employees, so that he may be able to handle them accordingly. The employer should possess an understanding of human mind and make the labourer feel that the enterprise is his own. An advertiser and a salesman have to read the minds of those to whom they address.

The principles of psychology can be applied to many legal problems. The mentality of the criminal can be diagnosed before awarding him any punishment. Young offenders are allowed a latitude.

The Nervous System consists of the brain, the spinal cord and the nerves (silvery-looking fibres or threads) which the

brain and the spinal cord send off to all parts of the body. For details *vide* page 160.

Nerves. A nerve is a thin fibre or bundle of thin fibres connecting and conveying impulses of sensation and motion between brain or spinal cord or ganglionic organ and some part of the body. The thin fibres are called *neurons*. A neuron is made up of the *nervecell*, the *axon*, the *dendrite* and the *end-brush*. The nerve-cell, with its nucleus, is the origin from where all the rest follow. The axon is the nerve-fibre issuing from nerve-cell. It may be several feet long. The dendrites are short, tree-like branches or growths of the nerve-cell. The end-brush is a tuft of branches at the end of axon. It is estimated that human body contains about 10,000,000,000 neurons. Every neuron is a complete, self-contained unit.

Nerve-Current. Its exact nature is still unknown. It is generally held that it consists of electro-chemical waves. Stimulation produces a series of chemical changes in the nerve-fibres, which in turn give rise to electrical changes.

Brain convoluted nervous substance in the skull of vertebrates is the great centre of the Nervous System. It is contained in the cavity of the skull. A large brain is the sign of a great mind. A small brain below a certain size is the sign of idiocy. Average male brain weighs 49 ounces whereas the female brain is 44 ounces.

The *Cerebrum*, the *Cerebellum* and the *Medulla Oblongata* are three parts of the brain. The *cerebrum* (the chief part of the brain) contains folds which, if spread out, can occupy about 670 square inches. In the lower animals the cerebrum has no folds, but as we go higher they begin to appear. The cerebrum also varies from one human being to another. In a highly cultivated person, the folds are highly developed. Mental powers of an individual are proportionate to the folds of his cerebrum. The different types of sense organs transmit their messages to different parts of the cerebrum; and different parts of the cerebrum control the movements of the different parts of the body. The nerve-cells of the cerebrum are of two main kinds: firstly, those which are stimulated directly through the sense-organs and produce sensations and, secondly, those which are stimulated indirectly by other nerve-cells and

produce "images", "ideas" or "memories". Around each sensory and motor nerve there is an association area concerned with images, ideas, memories, etc., of the particular sense and movement. There are also large unspecialised association areas which are mainly concerned with the higher thought processes. Among the large unspecialised association areas are the *prefrontal* or *frontal association areas*. The main concern of these areas is not with purely intellectual functions but with the rational control of behaviour. We possess such qualities as initiative, foresight, self-control, etc., on account of these areas of the cerebrum.

Cerebellum, also called the Little Brain, lies beneath the back par of the cerebrum and weighs about one-tenth of the entire brain. It exercises an influence over the muscles of the body and regulates their movements, as for example, in walking, running, speaking, singing, etc., many muscles are brought into play simultaneously. The cerebellum co-ordinates our muscular movements and maintains our bodily equilibrium.

The *Medulla Oblongata*, about an inch and a half in length shaped like a pyramid, situated under the cerebellum, is the thick upper portion of the spinal cord. It is contained within the cavity of the skull. It links brain and the spinal cord. Nerve currents pass through it to the spinal cord and to the cerebellum. At the *vital knot*, small spots in the Medulla Oblongata, are lodged a group of nerve-cells which control the actions of the lungs and the heart. Injury on the lower portion of the medulla stops the work of respiration and circulation of the lungs and the heart at once. It results in instantaneous death. But if the upper portion of the medulla is injured, the connection between the cerebrum and the rest of the body is broken and consequently all power of producing voluntary movements and of feeling sensations is lost.

Spinal Cord runs through the canal of the vertebral column or the backbone. It is about 16 to 18 inches in length.

The spinal cord receives impressions from different parts of the body through its sensory nerves. The impressions are conveyed to the brain. There they produce sensations or consciousness. Orders of the brain are trans-

mitted to the muscles of the body and thus voluntary movements are caused. The spinal cord also reflects or sends back the current or impulse which is sent to it by the sensory nerves. It is called a *reflex movement.* If the spinal cord is severed from the brain by an accident, the connection between the brain and the rest of the body is broken, and all the other parts of the body become paralysed. Thereafter the messages can neither reach the brain to produce sensations and consciousness nor come from the brain to produce voluntary movements in the muscles.

Three-fold Division of Mental Phenomena. The following are three aspects or modes in which mind manifests itself:

Cognition: Action or faculty of knowing, perçeiving, conceiving, as opposed to emotion or volition. The term cognition is used for al- knowing processes.

Affection: Mer ate, emotion, feeling. The term means being pleased o pleased with an object, in liking or disliking it.

Conation: (from Latin *conari;* to strive). The exertion of willing that desire or aversion shall issue in action. The term is a mode of consciousness tending to lead to action. Conation manifests in the form of trying, striving or putting forth of effort.

Cognition, affection and conation are always interconnected in a mental experience. Ever bject gives us a *knowledge* of itself which has pleasing or displeasing effect and we strive to attain what is agreeable and avoid or escape what is displeasing. These three aspects are not completely balanced in our mind. One aspect may predominate and the mind is known by that aspect. Affection prevails in women as they are tender-hearted and the feeling aspect predominates in them. In dry people like mathematicians, philosophers, scientists cognition prevails. In men of action like President Nasser of the U.A.R. conation is supreme.

Subconscious Processes. Fore-conscious or pre-conscious are those processes which go on just below the margin of consciousness. The attribute of consciousness is temporarily missing in them. They can become conscious, since they can be recalled at will when needed.

Unconscious Processes are those processes of which we are totally unaware. They lie buried deep down in the hidden recesses of our minds. They cannot become conscious unless the special methods of psycho-analysis are applied. It is believed that below the level of consciousness there is constantly going on a stream of processes of which we are not conscious. The subconscious and unconscious processes are simply those mental processes which we have forgotten and which, nonetheless, remain active in the same way as before.

Field of Consciousness consists of *all the objects* that are 'before' the mind at any time. While sitting in a class-room and listening to a lecture a student is conscious of the lecture of the lecturer himself: table, chair, blackboard which he sees. All these things constitute his *field of consciousness*. There are degrees of consciousness, *i.e.*, "more" or "less" *e.g.*, the student is more conscious of the lecture than lecturer's clothes or chair. The field of consciousness can thus be divided into two parts: the *central* and the *marginal*.

Attention. The term may be defined as the process of the narrowing of the *field of consciousness* and the consequent increase in the clearness of it. The central field of consciousness is the field of attention. It contains objects that we have *selected* out of the total field of consciousness, when we are inattentive or absent-minded the whole field of consciousness is equally clear. Nothing particular stands out in it. "The stream of consciousness" flows at a uniform level, there are no waves rising in the form of striking or vivid ideas. But in the case of attention the stream of consciousness does not run at the same level, the crests and the waves mark attention, and the troughs or hollow places between the waves indicate our absent-mindedness.

A prominent object, *e.g.*, a loud noise, a large object, *e.g.*, full advertisement in a newspaper, conspicuous object, *e.g.*, impressive colours, a definite form, a moving object, *e.g.*, a galloping horse, an unusual object, repetition, *e.g.*, ringing a call-bell repeatedly, etc. all attract our attention. These are known as objective conditions. The subjective conditions are the factors that belong to the person attending rather than the object attended to, *e.g.*, freshness, interest, etc.

Passive attention is the one forced on us by objects, *e.g.*, loud sound; dazzling lights, etc. Active attention is the one that requires an effort on our part, *e.g.*, in solving a problem of Geometry.

Range of Attention. How many things can we hold in our attention at the same time? The span or range of attention in the case of disarranged and meaningless material is proved by experiment to be much less in the case of arranged and meaningful material. We can grasp at a glance 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, as they are arranged but cannot grasp 1, 11, 9, 7, 5, 3, 2, 6, as they are disarranged. Similarly it is easy to grasp "I am going to school" than "School I to going am" because the one is meaningful and the other is meaningless.

Sensations (having sense: feeling). As dictionaries say, the word 'emotion' means: consciousness of perceiving or seeming to perceive some state or affection of one's body or its parts or senses or of one's mind or its emotions, contents of such consciousness, *e.g.*, emotion of heat, pain, thirst, deafness, pride stupidity. Technically sensations are defined as elementary, abstract, cognitive processes, caused by the stimulation of sense organs, and giving knowledge either of qualities of outside objects or of state of our own bodies, *e.g.*, redness or coldness.

Our simple experiences like seeing, hearing, smelling, tasting and touching are called sensations. They come through definite sense organs, namely, the eyes, the nose, the tongue and the skin. The sense organs are instruments for receiving impressions from various kinds of stimuli, in other words they are receptors. A sensation arises only when a sense organ is stimulated or excited by certain internal or external influences, technically called "stimuli". Brain is the seat of sensations and nerves are the means of communication. Sensations of sight, sensation of taste, sensation of touch, etc., are all felt in the brain. A sensory nerve conveys the excitation from that sense organ to the brain.

The following are the main kinds of sensations:

Eye Sensations. Rays of light are the stimuli for sight sensations. Some nocturnal animals with very sensitive-

eyes can see even in a very dim light, but they cannot see in the total absence of light.

Sight is regarded as the most refined of all the senses. It can detect the fine differences of degree and quality of objects. It also supplies information about the distance, form, position, size and movement of objects. In the development of sight sensation there are two stages, namely: brightness sensations, *viz.*, white, black and grey, and colour sensations, *viz.*, of red, yellow, green and blue. Colour vision is due to the fact that the cones give different responses to light of different wavelengths. Ordinarily white light is the mixture of all the wavelengths in the spectrum. The different colours of different objects are really due to different absorptions.

COLOUR-BLINDNESS. Owing to defective development of the cones some people are totally or partially colour-blind. In total colour-blindness one can have only sensations of brightness but not of colours. He sees the world only in white, black and grey. He does not see things as coloured red, blue, green and yellow. Partial colour-blindness is *red-green blindness*. A partial colour-blind person can see yellow and blue as well as white and black, but not red and green. For employments requiring discrimination of colour, candidates are subjected to rigorous colour tests. Engine-drivers and navigating officers are required to pass such tests.

Ear Sensations. A vibration or motion in the air is the stimulus for sound sensations. Waves of sound are produced by the vibration of bodies in the air. If we throw a stone into a pool of water a series of small circular ripples arise from the place where the stone falls and gradually spreads out over the surface of water. Sound-waves are also similarly produced by vibration of bodies in the air. The speed of air-waves is 1000 feet per second. There can be no sound sensations without air. Our ears, externally and internally, are ideally shaped for receiving sound waves. When the vibrations are regular or of simple harmonic form, the sensation is that of musical tones, but when the vibrations are irregular and disharmonic, the sensation is that of noise.

Skin Sensations. We have skin spread all over our bodies. The skin gives four distinct sensations, *viz*., pressure, pain, warmth and cold. The sensations are felt at particular spots: touch spots, pain spots, warmth spots and cold spots. The pressure sensation is a very important means of ascertaining the properties of bodies. It gives us the qualitative differences of smoothness, softness, roughness and harshness. This is highly developed in blind persons. They can be taught to read and to do various occupations such as sewing, knitting, mat-making, etc., with the help of their delicate sense of touch.

Nose Sensations (*Smell*). The stimuli for nose sensation or sensation of smell are gaseous substances inhaled or drawn in with the air. It is increased by sniffing. On smelling something as odorous particles are conveyed in the form of a gas into the upper region of the nasal cavities or nostrils. The olfactory nerve carries the impulse further to the brain. It is in the brain that the sensation of smell takes place. It is necessary that the odorous substances should first get dissolved in the moisture covering the nasal mucous membrane, otherwise the sensation of smell is not produced.

Smell sensation plays a very important part in the life of the lower animals. They seek their prey and find their way about by means of it. It is the means of scent that a dog knows its master approach as well as track. Odours are found in greatest intensity and variety near the ground.

There are connections between the cavity of the mouth and that of nose. As such, the sensation of smell is connected with the sensation of taste. That is why we can judge the taste of a thing by smelling it. The value of smell considered from the point of view of knowledge is comparatively insignificant. "Smell is in general the least intellectual of all sensations", says Ladd.

Tongue Sensations (*Taste*). It is only by chemical substances in solution that the sensation of taste can be produced. The taste cells are situated just a little away in the tongue and not on the surface. Therefore, the substance tasted must be a liquid or a soluble substance so as to pass into the pits.

The tongue has two layers: an outer surface called the

epithelium and an inner sensitive layer. The inner layer is shaped into folds, technically called *papillae*. They vary in shape and size. Inside these folds there are little pits filled by *taste buds* or *taste-bulbs*, each of which contains a number of taste cells. Particles of anything we taste stimulate these cells which convey the impression to the brain by the gustatory nerve. The sensation of taste thus takes place. Sweet, bitter, sour and salt are four elementary tastes. Other tastes are compounds of these. "The sensation of sweet is strongest at the tip of the tongue; bitter at the root; sour along the sides; salt at fairly evenly distributed over all the areas," says Titchener. Thus different parts of the tongue are sensitive to different kinds of taste.

Perception (from Latin, *per cipere*, take, seize thoroughly); act, faculty of perceiving; intuitive recognition (of truth, aesthetic quality, etc.), (philosophy) act by which the mind refers its sensations to external object as cause. Technically perception is defined as a concrete, complex, cognitive process, aroused by the stimulation of a sense organ, and giving us knowledge of things in the outside world, which can be analysed into a sensation or sensations, and ideas simultaneously associated with these sensations. It is also sometimes said that Perception=Sensation+Meaning or Perception= Sensation+Thought. The function of perception is to analyse the world around us into distinct objects.

The process of interpreting or giving *meaning* to sensations, so as to know by means of them the external objects is called *perception*. Perception is that knowledge of objects which comes through sensations. Sensations are, of course, necessary to perception, but that does not mean that perception is made up out of sensations. It is rather f perception that we infer the existence of "sensation". Sensations supply us the *means* and *materials*, by which we have our knowledge of the external world. When sensations are referred to objects we are said to give meaning to them. When a sensation is before the mind, the mind sets about its business of finding relations and, by so doing, gives meaning to the sensation. The meaning given depends upon the relation with which the mind is already stored. We not only *cognize* the existence of that object but also *recognize* what it is. Our perception of

an apple can be analysed into sensations of sweetness, softness and redness. We straightaway perceive it and then analyse it into the sensations of sweetness, softness and redness. But when one sees it for the first time in his life it is through sensations alone that it can be perceived.

Development. There are three stages in the development of perception: pure, mixed and symbolic.

Pure perception is present in the early days of mental development. It includes only outside sensations coming from the object of perception. Nothing is contributed from the mind.

Mixed perception or assimilation is the second stage. At this stage perception does not entirely depend upon the sensations aroused by the external object, but it includes both outside sensations and inside impressions or ideas. The mind at this stage assimilates certain images of its own and supplements by means of them the sensations received from the external object.

The third and final stage is that of symbolic perception. At this stage perception consists merely of inside impressions and includes almost no external sensation.

To sum up: pure perception includes entirely outside sensations: mixed perception includes partly outside sensations and partly inside impressions; and symbolic perception includes entirely inside impressions stimulated by a sign or symbol of an object.

Apperception means the interpretation of a perception in the light of past experience as well as existing circumstances, expectations, etc. The term means "a perception whose character or meaning is chiefly determined, not by the nature of the sensations but by the influence of the past experience." Previous experience plays an important role in our present perception. "Perception is a synthetic experience, and a combination of the new and the old is the essential part of the synthesis. This process of combining the new and the old often called apperception," says Angell.

Every mind *selects* and *interprets* its sense-impressions in its own way. Differences in our perceptions arise because

we look at the world through our own coloured glasses. Actually we do not perceive but apperceive on the basis of our individual tendencies and interest. Just as different plants take different items of their food out of the same earth, so our perceptions of objects may have different conceptions. A sportsman, a business-man, a politician, a journalist view daily newspapers differently.

Illusion, deception, delusion, sensuous perception of an internal object involving a false belief, a false perception may be due to limitation or defects of our sense organs *e.g.*, mistaking an aeroplane flying at a great height for a bird, or due to a wrong interpretation of the sensations provided by our sense organs, *e.g.*, mistaking a white pillar for a ghost. Although illusions arise from all kinds of sensations but those which rise in connection with sight, called optic illusions, are most common. They may be different in size, distance, direction and movement.

Illusions are due to—

(*i*) abnormal conditions or defects of our sense organs, *e.g.*, colour-blindness.

(*ii*) limitations of our sense organs, *e.g.*, very low sounds cannot be heard;

(*iii*) apperception or the state of our mind at the moment, *e.g.*, a proof-reader's illusion as he passes over a mistake and has the illusion of taking it for the right word, and,

(*iv*) odd arrangements of stimuli.

Hallucination: illusion, apparent perception of external object not actually present. An illusion is an erroneous perception, but a hallucination is no perception at all. If we mistake a rope for a snake, it is illusion, but if there is nothing of the sort and our mind perceives a snake it is hallucination. A drunkard or insane person who goes on talking as if addressing somebody is under hallucination. "One patient used to have the feeling that her arm had darted up and struck a nurse, and she always had to be reassured that nothing of the kind had happened." Dream-experiences are of the nature of hallucination in so far as the objects which do not exist in the world outside are perceived in dreams.

Habit: settled tendency or practice. It consists in the facility and tendency to perform over again, and more or less automatically actions which were at first performed with effortful attention. So habit is a series of acts which are repeated from time to time, often quite automatically. "The phenomena of habit in living things are due to the plasticity of the organic material of which their bodies are composed"—James. Plasticity means "the possession of a structure weak enough to yield to an influence but strong enough not to yield at once." If certain nerve centres are constantly excited by the same stimulus, they set up certain paths in the plastic matter of our nervous system. Physiologically speaking, the formation of these paths is called *habit*.

The law of formation of habit is stated as follows:—

"Any course of action or any set of movements, which has been repeated in the same order and manner as before, gradually becomes secondarily automatic. In other words, if once we should have acted in some particular manner, then if the same circumstances recur, we shall have a tendency to act in precisely the same manner again. If we do act again in this manner, the tendency to do so a third time will be stronger; and still stronger the fourth time, and thus stronger and stronger grows tendency, and again and again the action is repeated. Eventually the action or chain of actions will become entirely mechanical, almost effortless and probably unconscious. This is what is meant by the formation of habit."

Learning means acquiring skill or efficiency in meeting situations which are relatively novel to the individual. The process of learning is constantly going on in all human beings and animals.

We learn by trial and error. "The trial and error procedure in tackling a problem consists in doing something which probably does not succeed, then doing something else, and so on till something does succeed"—Wordsworth. This method does not involve much intelligence. It is just a *hit-or-miss affair*. Learning by intelligence is another method. Man can make an intelligent survey of the situation. He can adapt himself to the situation promptly. The animal, on the other hand, has a tendency to respond impulsively to a situation,

without considering or looking ahead. Learning by imitation is the third method. Man can learn by observing others do a thing. It is a matter of common experience in the case of a child. But this method of learning is extremely rare among a large majority of the lower animals. They can learn by doing.

Image means the consciousness of an object as not present to sense. If you recall in your mind the face of your friend who is now dead, you have an image. If a painter summons to his mind the person whose portrait he is painting he is having an image. Perception, on the other hand, consists in the cognition or knowledge of objects *as present to sense.*

Idea (Greek: from *id*, see) conception, plan of thing to be aimed at. An idea is a significant image. It represents the thing of which that it is made of. "The image is only one constituent of the idea; the other and *more important* constituent is the meaning which the image conveys," says Stout. Thus idea=image+meaning.

Ideas like images are less stable, and more sketchy than perceptions. But they are not identical. An idea is an image having a meaning, *i.e.*, context or significance.

The most common images are those of vision and hearing. Individuals differ in their imagery. Some persons are rich in visual images, other persons in others. They represent with great vividness the impressions (*images*) received by them.

Law of Association of Ideas. It is interesting to note about imagery that our ideas succeed one another in a more or less orderly manner. They tend to recur in the original order and become so related that they "suggest" one another, *e.g.*, the idea of Agra brings to one's mind, the idea of the Taj. One idea recalls another. This is so because association of ideas is one of the most important laws of mind. It is expressed thus: "The connection which one idea has formed with another idea tends to persist, so that when one idea comes up into consciousness, the other connected idea tends also to be brought along with it." This is called the law of association of ideas. Aristotle first formulated the fundamental laws of association. They are (*i*) association by contiguity, (*ii*) association by similarity, (*iii*) association by contrast and (*iv*) association by cause and effect.

Memory: Latin *memoria, memor:* mindful, from root *mer:* remember). Faculty of remembering. Memory means the *revival* of things and events experienced earlier. The revival is in the form of ideas and mental images. It is the recall of an old personal experience which had temporarily gone out of our consciousness.

Psychologists speak of the *triple process* of memory. The *three stages*, or factors involved in memory are: *retention*, *reproduction* and *recognition*.

Retention is retaining the traces of past experience, certain "dispositions" or "traces". It is preservation of certain after-effects of past experience. "Advance would be impossible unless the results of prior process persisted as the basis and starting point of subsequent process....No house could be built if each brick vanished as it was laid and had to be replaced anew. A rope cannot be formed of dry sand, which crumbles away as it is put together. Similarly, mental development would be impossible unless previous experience left behind it has persistent after-effects to determine the nature and course of subsequent experience," says Stout. These after-effects are commonly known as brain-traces or memory traces.

Reproduction (or *Recollection*, or *Recall*). Reviving or bringing back into consciousness an old experience in the same form, order and connection in which it was originally experienced. A retained experience is recalled by means of the laws of association, *e.g.*, the death of one's neighbour may be recalled by association of his own brother. The factors which favour recall, *viz.*, primacy, recency, frequency, vividness and interest, are those which cause an experience to impress itself deeply on our minds.

Recognition simply means the consciousness that we have experienced, the recalled event before, one recognises his old class-fellow there comes into his mind a series of associated ideas, *e.g.*, his name, intelligence, class-room etc.

Forgetfulness. We forget most of our past experiences. "There seems to be a constant decay of all our ideas, even of those which are struck deepest ; so that if they be not renewed . . . the print wears out and at last there remains

nothing to be seen. The ideas, as well as the children of our youth, often die before us, and our minds represent to us those tombs to which we are approaching; where though the brass and marble remain, yet the inscriptions are effaced by time, and the imagery moulders away." Forgetting thus means decay or disappearance. It is because of fading away of past experiences and of their lines of connection with one another with the *lapse of time*.

Forgetfulness is neither a defect nor a disease of memory. On the other hand, it is necessary for usefulness and health of memory. The holding capacity of both brain and mind is limited and old impressions must be erased to make room for the new ones. Just as a blackboard must be cleaned for writing afresh, old impressions must be effaced for taking fresh ones. "If we remember every incident of every day—at which time we got-up, what letters we received, what we had to eat and drink, what exercise we took, what work we did—we should be lost in the wealth of our own ideas"—Titchener. But we must remember what is essential and relevant to our present purpose. Only the useless should be forgotten.

Forgetting may be due to certain causes such as natural fading away of the traces of past experiences, bodily and especially brain injuries, emotional conditions, etc.

General conditions favourable to memories are:—

(*i*) freshness of health and body,

(*ii*) careful observation and keen study of the material,

(*iii*) interest,

(*iv*) persistent repetition,

(*v*) setting up of appropriate associations and rhythm,

(*vi*) active recitation, and

(*vii*) freedom from excitement and fear, "in general memory training consists in improved management of the learning process. Observant study, alive to patterns, relationships, meanings, and promising eyes for later recall—economy of efforts in learning by use of recitation, spacing, and the best combination of the whole and past study to fit the material in hand—these principles of good manage-

ment indicate the field in which memory can be effectively trained"—Wordsworth. There is, however, no universal memory-aid scheme.

Imagination. Imagining, mental faculty forming images of external objects not present to the senses; fancy, creative faculty of the mind.

Imagination, like memory, means the recall of facts or objects previously experienced. But they are also rearranged and manipulated so as to give a new result which is different in form and order from which it was experienced in the past. Memory, on the other hand, means mere reproduction of past experience. In imagination the revived elements of our actual experience are recombined and reconstructed in a new way and they come to us with some novelty or strangeness. The process of imagination is best found in poetry, fiction, romance, other works of art, etc., where we combine revived elements of past experience in a new way.

Instinct. Innate, tendency, especially in lower animals, to certain seemingly rational acts performed in a conscious design. It is an *inborn* or *native* tendency to a stimulus. It is inherited. Wordsworth defined it as "unlearned behaviour". A newly hatched chick is terrified at a sudden loud noise untaught by past experience. It occurs because of tendency which actually exists in the mind of the chick at birth. It is inherent. Similarly a new-born baby instinctively seeks its mother's breast. An instinctive action is, therefore, defined as "a response which is unlearned and more or less stereotyped in form." "Instinctive behaviour does not need to be learnt; it is inborn. It is not "intended" but automatic and involuntary. It is independent of thought, intelligence, experience, example or training, and is stereotyped in form."

Unlike birds and insects, however, man does not perform his actions by instinct alone. His instinctive behaviour is far more flexible and adaptable as compared with that of animals. Man can grow into a full and deliberate consciousness of his instinctive tendencies and, as a result, he can control and alter the resulting instinctive actions.

Emotion. Agitation of mind, feeling, excited mental state. Some psychologists have described emotions as

intense and violent feelings. Fear and anger are typical examples. An emotion may be defined as "a complex affective mental process in which train of ideas is interrupted more or less suddenly by a new situation, known to our minds in a complex simultaneous association of our ideas with a strong effective tone, which is supplemented further by a number of organic sensations and also with a strong effective tone. An emotion may also be regarded as the affective aspect of an instinct." Hoffding, speaks of emotion as a *sudden boiling up of feeling* which, for a time, overwhelms the mind. In the words of Wordsworth, "Emotion is a moved or stirred up state of the organism." Organic or physiological disturbances accompany emotions. Every emotional excitement gives rise to extensive agitation all through the body.

Emotions are caused in a state of unpreparedness to meet a situation. A situation, *e.g.*, fear, overtakes us suddenly and unexpectedly and overpowers us at once. We are unprepared for that. As such, for the time being, the whole of our consciousness is coloured with an emotion. Changes take place in our body.

Emotion has its characteristics. Every emotion depends upon some instinct. It arises abruptly but dies down slowly. Kant compares it to a flood which bursts its dam. In every emotion when a climax is reached it begins to abate and reaction comes on. Emotions are found in lower animals as well. They are highly complex processes of consciousness. aroused not by a simple object but by total situation in which the object happens to be placed. They are always highly tinged with pleasantness or unpleasantness. Emotions are always accompanied by organic or bodily disturbances and symptoms. They are our subjects. Every emotion contains an impulse to some kind of action, *e.g.*, in anger for an attack and in fear for escape. Emotions are also aroused by certain organic conditions of the body. You will find a man in bad health short-tempered. It is, therefore, held that for getting a favour out of an old man he should be approached after he had taken his dinner.

Mood (state of mind or feeling) is a tone of our mind for the time being which is mainly determined by organic condi-

tions. In essence, both emotion and mood are the same. They differ only in intensity and duration. Mood is of a longer duration and a weaker intensity than emotion. Persons susceptible to moods are called moody persons.

Temperament, individual character of one's physical organization permanently affecting the manner of acting, feeling and thinking. Technically, by temperament is understood a permanent system of emotional dispositions in an individual. A mood lasts for a short period but when a mood spreads over a long part of an individual's life it becomes a temperament. "Temperament is a mood which has become permanent. It is a pre-disposition to look upon the world and life in a particular way—brightly or gloomily," said Pillsbury. Mood is an emotion 'long drawn out', a temperament is a mood "long drawn out".

Temperaments are: the *choleric:* liable to anger due to an excess of bile (brownish-yellow bitter fluid secreted by the liver to aid digestion) in the body; the *sanguine:* liable to excessive cheerfulness and optimism, due to an excess of blood (Latin *sanguis*) in the bony; the *melancholic:* liable to excessive gloom and pessimism, due to an excess of black bile in the body; the phlegmatic: has little emotion and is moved to feeling with difficulty: due to an excess of phlegm secretions from our throats in the body; the *nervous*, due to an excess of the 'nerve fluid' in the body. Jung, a great modern psycho-analyst, has divided individuals into two types, the *introverts*—whose emotions are not directed to the outside world but to their own thoughts and imagination, and the *extroverts* who concern themselves with the outer world of reality.

Sentiment (from Latin *sentire*, feel). Tendency to be swayed by feeling rather than by reason, emotional weakness, mawkish tenderness or the display of it. Technically sentiment is defined as a complex or more or less permanent emotional state of mind with regard to a definite object, and predisposing its owner to a certain specific emotion. Sentiment is closely related to emotion.

Titchener pointed out that in all sentiments judgements are involved while in emotions only association of ideas are implied. A sentiment implies an intellectual element of opinion, *e.g.*, sentiment of patriotism. Sentiments are

generally attached to definite objects whereas emotions are not so attached.

Sentiments have been classified in many different ways. Titchener classifies them into:—(*a*) *intellectual sentiments* directed to the objects of our thought, theories, arguments, beliefs, opinions and judgements. Such sentiments involve the intellectual judgement, 'this is false' or 'this is true'. Belief is an example of this sentiment. (*b*) *Social sentiments* are directed towards human behaviour. They also involve the intellectual judgements telling whether a certain behaviour is 'right,' 'wrong', 'good' or 'bad'. Guilt is a social sentiment (*c*) *Religious sentiments* are directed to thought-objects, *e.g.*, religious beliefs and doctrines, and to our own human behaviour. These sentiments also involve the intellectual judgements, "this is righteous" or "this is sinful". (*d*) *Aesthetic sentiments* are primarily directed to the perception that we have through our eyes and ears, *e.g.*, pictures, music, scenery. Such sentiments involve the intellectual judgement: "this is beautiful" or "this is ugly."

Thinking: Exercising the mind otherwise than by passive reception of another's ideas. Thinking is the attempt to solve a problem which presents novel features and for the solution of which the individual draws upon his past experience. Thinking is natural in what we call a problem-situation. It involves asking questions and trying to find out answers to those questions. To be thinking is to be in a questioning frame of mind. In thinking we have both foresight and hindsight. It is held that animals also show signs of thinking when placed in problem.

Reasoning is the highest form of thinking. It is perhaps a purely human achievement. Reasoning consists in passing from one or more given propositions to another proposition which follows from them. The whole process of reasoning contains four part-processes, *viz.*, collecting the data, combining the data, seeing the implications of combined data and testing of conclusion. These processes are often jumbled while reasoning. The whole process of reasoning very seldom runs off smoothly. It works both forward from what is given and backward from what is to be proved.

Dream. Vision, series of pictures or events, presented to a sleeping person. The series of images, ideas or thoughts are the result of mental activity. The dream is a function of the mind, which allows repressed thoughts and unfulfilled wishes to find some measure of relief. This is more or less true of all kinds of dreams. The anxiety-dream is no exception.

Ancient Egyptians explained dreams by supernatural theories, often thought divinely inspired as in the dreams of Jacob and Joseph. By the modern followers of Sigmund Freud, a psychologist, who published his "Interpretation of Dream" in 1900, a dream is regarded as full symbolism, a repressed wish sometimes making itself manifest in a very undisguised form if the symbolism is correctly interpreted. So far as Freud's views on dreams are concerned, they may be unplausible in certain respects, but in others they show great original insight.

Characteristics of dreams. The chief characteristics are:

(*a*) the fantastic and disorderly arrangement of dream images or scenes;

(*b*) our unquestioning acceptance of them as real while they last;

(*c*) they show an accelerated flow of ideas, a swift portrayal of scenes;

(*d*) dreams are wish-fulfilments;

(*e*) they are with symbolic nature.

Hypnotism (from Greek word *hupnoo:* make sleep) is (artificial production) of a state resembling deep sleep, in which the subject acts only on external suggestion. Hypnotism, induction of hypnosis, a state resembling profound sleep, usually artificially induced; marked by subconscious activity and sensitiveness to suggestion. The method has been known in the East from remote antiquity: but it was not until the 18th century that F. A. Mesmer introduced it into Europe under the name of *Mesmerism.* Mesmer's theories were discredited, and nothing more was heard of the method until

Baid revived it in 1841. It plays an important part in the therapy of psycho-analysis.

Hypnotism commonly requires two persons, the *hypnotiser* (or operator) and the *subject* (or medium).

During hypnosis, the hypnotiser's suggestions control our muscular processes. How do the suggestions of the hypnotiser gain this power? How does this shift in the forces that control behaviour take place? Different explanations have been put forward from time to time.

Hypnosis is terminated by reversing the process by which it was induced. Hypnosis is not a state of unconsciousness. A subject can sometimes tell us what hypnotic experience is like.

Insanity is a disease or disorder of the nervous system, producing an abnormality of the mind. As there are grades of mental deviation from the normal, the term cannot be defined precisely. Broadly speaking, a person who cannot take care of his affairs or is dangerous to himself or other people—who is, in fact, unfit to lead a normal social life may be considered insane. The causes of insanity are pre-disposing or exciting, both frequently operating together. The commonest pre-disposing cause seems to be heredity. The exciting causes are toxic in nature, and take the form of poisonous substances which circulate in the blood, are carried to the brain and destroy the functions of the nerve cells. Alcohol is the most common of these. Diseases like syphilis, influenza, consumption and diabetes, may affect the brain.

Mental diseases are of two types:

(*a*) Those due to the fact that mind has stood still and has not fully developed.

(*b*) Those due to disorders of the fully developed mind.

Those whose mind did not develop fully are:—

(*a*) *Idiots:* who remain in the stage of babyhood in mental development.

(*b*) *Imbeciles:* whose mind remains at the stage of young children, but they can't do regular work or take intelligent decisions.

(*c*) *Morons:* who are just below the level of normal development.

Mental diseases of the "disorder" type are:

(*a*) *Neurosis* or minor mental disorders:

(*i*) *Neurasthenia*, when a person is restless, can't think, can't settle to anything: has feelings of anxiety, gets palpitations and sweats; feels as if something awful is going to happen to him; stammers and hesitates in speech; in short, he is a puzzled, unhappy person. He has feelings of inferiority.

(*ii*) *Psycho-asthenia*, neurotic ailments characterised by obsessious (silly repeating thoughts), phobias (unreasonable and uncontrollable fear of something), convulsions (uncontrollable impulse to do an act recognised by all to be wrong or foolish), doubts and scruples.

(*iii*) *Hysteria*, fits in which one loses all control of himself. Mild disorders of the hysterical or functional type are quite common in our everyday life.

(*b*) *Psychos*; serious mental disease. They are divided into two groups, the functional psychoses which cannot be shown to be due to any physical defect, and the organic psychoses which can be attributed to some actual damage to the nervous system of the brain.

Psycho-analysis. It is generally believed that the greater part of the human mind is unconscious. Only a smali part appears above the level of consciousness, the remainder lies below. This remainder, called the 'unconscious', is considered to be very important as it is believed to determine, to a great extent, the contents and workings of the conscious mind. To explore the hidden trend of the subconscious mind is the object of psycho-analysis. Psycho-analysis is the name applied to the technique evolved by Professor Sigmund Freud, of Vienna, in connection with the exploration of human mental phenomena, and for the treatment of mental disorders in

human beings. Freud based it on the theory that mental disorders and certain abnormalities of behaviour are the result of conflict between the conscious mind and repressed ideas. An abnormality of behaviour, such as hysterical symptom, is, according to Freudian theory, the result of the conversion of an omitted act or unliberated idea into that abnormality. It followed that if the repressed idea could be made conscious to the patient, and the diverted energy associated with the diverted idea allowed to discharge itself consciously, recovery would ensue.

Views of Adler have also obtained wide currency. According to him, everyone possesses an urge to assert himself, to raise himself above the general level, to excel, to shine. It is in man's nature to prove himself superior to others. He feels unhappy when he finds himself to be otherwise. This craving for superiority is the cause of mental disorders. It is the business of psycho-analyst to prevent the patient's tendency of self-assertion from going to extremes.

EXAMINATION QUESTIONS

(*On Section I: Life on the Earth*)

1. *How does reproduction in plants take place?*

In angiosperms the reproductive organs are contained in flowers. The transference of male sex cells of a plant to female sex organs is known as *pollination*. This process is brought about through carriers like air, water, insects, birds and animals etc. Pollination is followed by fertilization where male and female sex cells fuse and form a single composite cell called *zygote*, which enlarges, develops and finally produces seeds and fruits.

In certain angiosperms reproduction is brought about by root, stem or leaves. This mode of reproduction is known as vegetative propagation. Potato, tuber, ginger; rose etc. are common examples.

2. *What is meant by saying "Man is descended from the monkeys" and what basis is there for this statement?*

"Man is descended from the monkeys" means that originally man and monkeys both belonged to the same stock of animals. In course of time animals evolved into monkeys and monkeys into men. The reasons for this theory of evolution are (1) there is no difference visible between man and monkey in the embryonic stage. (2) A set of bones in human body shows that they had tails. (3) Man and monkey resemble to a great extent.

3. *What are the advantages of needle-shaped leaves to the pine and fir families of trees?*

These trees (pines and firs) grow in exposed situations. Therefore, they experience the full force of the winds and storms. Owing to the peculiar shape of their leaves, the snow cannot lodge upon them and cause damage by its weight. The leaves offer little resistance to the winds which blow through them without causing any damage.

4. *Why do birds and poultry "moult" (change or cast the feathers at certain times)?*

Practically all living creatures change their coverings at certain times of the year. In the case of birds and poultry this is especially necessary as feathers get often broken and dirty. The feathers are gradually renewed.

5. *How is it that cats can see better than we can in the dark?*

In the dark, the pupil of cat's eye enlarges much more than that of human eye. The eye of cat thus admits more light than the human eye. Hence, cats are able to see much better than we can when it is almost dark.

6. *Give two ways in which wild animals are protected by Nature from their natural enemies.*

(*a*) The wild animals have the same colour, pattern, shape, etc., as the natural environments in which they live. Those living in grass are green while those dwelling in holes or the earth are brown coloured. They cannot be easily detected.

(*b*) They possess certain protective qualities and their enemies feel afraid of attacking them.

7. *How is it that the feet of birds differ so widely in shape?*

The feet of birds are adapted to the lives which they lead. Birds which spend their time in water have webbed feet; those which spend their time in the trees have feet for perching; climbing birds like the parrot and woodpecker have two toes in front and two behind and can thus climb with ease; those living in marshy districts, such as the stork and heron, have long stilt-like legs; those which spend most of their time on the ground have feet suitable for walking.

8. *In what ways are birds specially fitted for flying?*

Their bodies are shaped for moving through the air with the least amount of resistance; their bones are hollow and light; their muscles which help to move the wings are tough and strong. Their eyiesght is remarkably keen.

9. *Is soil necessary for the growth of a plant?*

No, it is not always necessary. Some plants can grow in water, and others send their roots or suckers into the substance of other plants either dead or living and derive their food entirely from them. The latter are called parasites.

10. *Why do some plants grow by water side, while others prefer dry spots to live upon?*

Some plants are naturally thirsty, *i.e.*, their leaves allow the water in them to evaporate quickly and it must be restored or the plants will die. Evergreens have hard, thick-skinned leaves which do not allow water to evaporate so quickly.

11. *In what ways are the seeds of plants distributed?*

Some of the means of distribution of plant seeds are (*a*) wind, (*b*) running water, (*c*) animals' bodies, (*d*) birds.

12. *Why is the wood of some trees hard in texture than others?*

The reason lies in the fact that hard-wooded trees take longer to mature. The oak which produces timber of very hard textures takes years to mature, whereas the poplar and willow, two soft-wooded trees, grow much more rapidly.

13. *How can the age of a tree be determined?*

The age of a tree can readily be determined by counting the rings found in transverse section of the tree. Each ring represents an year's growth, and the age of the tree is thus recorded.

14. *How are insects attracted to plants?*

Insects visit flowers to obtain honey. Some flowers attract insects by their fine colours or by the perfumes which they emit.

15. *Why does a flower, like a pansy, turn its face towards the sun?*

It is necessary for the proper growth of a plant that sun's rays should reach its leaves, etc. Some plants require sunlight comparatively more than others. So in order to get as much of light as possible, they spread their leaves horizontally and

their flowers face the sun. Moreover, several such plants require for their fertilisation insects and butterflies which like to sit with their wings spread in the sun. That is why these flowers have their faces towards the sun.

16. *What is the main difference between the food of plants and the food of animals? What is the common way in which a flowering plant (i) feeds itself, (ii) reproduces itself?*

Animals feed on vegetable produces and in some cases on animals. Plants obtain their food from the earth and out of the atmosphere by transpiration.

A flowering plant commonly feeds itself through its roots, stem and leaves. The roots absorb water and dissolved salts from the earth. They are conveyed to the plant by the stem. The leaves assimilate carbon from the carbon dioxide of the air by the action of the rays of the sun and exhale water.

The flowering plants reproduce themselves through the fertilisation of their ovariės by the pollen. The insects do it by carrying the pollen from one flower to another. The fertilised ovaries become seeds, which, when sown, reproduce the plant.

17. *What are the functions of the gills of a fish?*

All animals breathe in oxygen for their lives. Fishes have no lungs to breathe in air. It is the gills of fishes which perform this function. They filter out oxygen dissolved in the water and thus act as respiratory organs.

18. *Is whale a fish? If not, state your reasons.*

The whale is not a fish. A fish is a cold-blooded creature, breathes by drawing water through the gills and lays eggs from which its young are hatched. A whale, on the other hand, is a warm-blooded animal and breathes by means of lungs—consequently it has to come to the surface of water to breathe. Moreover, it is mammal, that is, it suckles its young ones.

19. *How do cows and horses respectively get up and lie down?*

Cows get up with hind-legs first, horses with forelegs first.

20. *What animals are the following:—*

(a) King of the beasts, (b) the Ship of the desert, (c) the King of the birds, (d) the Lion's provider and (e) the Light of the forest.

(*a*) Lion, (*b*) Camel, (*c*) Eagle, (*d*) Jackal and (*e*) Firefly.

21. *Where are the following found:—*

(a) Okapi, (b) Jaguar, (c) Kangaroo, (d) Bison and (e) Penguin?

(*a*) Belgian Congo (Africa), (*b*) America, (*c*) Australia, (*d*) North America and (*e*) Antarctic region.

22. *Which part of a fish acts as a propeller?*

A fish propels itself through the water by means of its tail. The fins merely help it to keep its balance. Fishermen often propel their boats used for landing with an oar similar to the way a fish uses its tail.

23. *What is a sea-horse and what is a sea-cow?*

A sea-horse is a fish. Its head is something like that of a horse. Ordinarily, it is a few inches in length. A sea-cow, also called a manati (or manatee), is a large sea-beast which may measure as much as 13 feet in length. The dugong, a similar beast, is also called a sea-cow.

24. *Can a dog-fish bark? If not, is there any fish that can bark?*

No. The conger-eel can bark.

25. *What is a plant?*

Plant is any member of vegetable kingdom. The structure of every plant is made of cells which have diverse functions. Some add to its structural strength, others carry food and water through it. Flowers are intended to bring reproduction. Flowers are modified leaves which have assumed several forms in their various roles. The food of the average plant consists of water, oxygen, carbon dioxide and varying amounts of nitrogen, phosphorus, sulphur, potassium, calcium and magnesium.

26. *Explain the reasons why aquatic plants are able to live and flourish under water, while land plants decay under similar conditions.*

Almost all plants are adapted to the environments in which they are usually found. Plants which are found in water can absorb both water and nutrient salts as well as the necessary gases (oxygen and carbon dioxide) from the water. This is done by their stems and leaves. Thus they can flourish under water. Land plants absorb water, and the salts only by the roots and carbon dioxide and oxygen only by the leaves. The leaves of land plants cannot get oxygen and carbon dioxide from water, and water and salt taken up by the roots is not enough. Therefore the land plants cannot flourish in water.

27. *What is a cell?*

In biology, a cell is the fundamentally simplest unit of structure of plants and animals, composed of a gelatinous substance, called protoplasm, which is regarded as the physical basis of life. A typical cell, sometimes called protoplast, consists of semi-fluid material, the cytoplasm and one or more denser bodies, the nuclei, embedded in it. Cell division begins by separation of the nucleus into two halves.

28. *What is an embryo?*

Embryo is the first germ of an organism. The fertilized egg cell undergoes cell division, resulting in the formation of tissues and organs. The development is a progressive differentiation accompanied by growth. Embryology is an important science continually being developed by experiments in germ cells.

29. *What is blood?*

Blood is a fluid with red atoms (minute particles) which circulates through arteries, veins, capillaries, providing nutrition and removing waste. Its colour is brighter in arteries than in veins. The red cells, atoms, contain iron substance, white atoms destroy dead tissues and ward off disease.

30. *What is meant by 'protective' colouring in nature? Describe some distinctive types.*

Cryptic colouring is very useful to animals in their struggle for existence. The colouring is utilized both for defensive and offensive purposes.

Generally, the colouring of animals matches with their environment. The black and white stripes of zebra blend together and their proportion exactly matches the pale tints produced by the moonlight in arid land. The colouring of the lion exactly matches the sandy grasslands in which it roams.

Sometimes the colouring of the animals is aided by special modifications of shape, etc. The animal is mistaken for some well known object. This is what happens in the case of insects which resemble pieces of straw, or in case of butterflies which fold their wings so as to look exactly like dry leaves.

The colouring of an animal may act as a signal or warning to an approaching enemy, who may mistake it for something unpleasant or dangerous. Another type of protective colouring is mimicry. In this case the animal resembles some other animal which is specially disliked by its enemy.

31. *What do you know about the hearts of animals?*

Heart is the muscular organ which propels the blood throughout the body. The human heart lies in the thoracic or chest cavity between the lungs. For details of human heart *vide* page 157. Sharks and fishes have two main chambers. In case of a frog the heart has three chambers. Birds and mammals are warm-blooded, whereas animals not possessing four-chambered hearts are cold-blooded. In the case of warm-blooded animals the body temperature tends to remain more or less constant or to vary within definite limits. In the case of cold-blooded animals the body temperature varies with the rise and fall of the surrounding temperature.

32. *What do you understand by fossils?*

Fossils (*zamin se khod kar nikale hue*) are any remains or indications of previously living animals or plants preserved in the crust of the earth. Entire animals are seldom preserved. Fossils usually are hard skeletal parts like the bones and teeth

of vertebrates, the skeletons of corals, the shells of molluscs. Fossils are not only preserved in water deposits but often found in caves under layers, deposits or on the surface especially in dry countries where the bones are protected against damp and other physical conditions likely to destroy them. The remains of land animals have little chance of being preserved, because for fossilization rapid and complete burial is essential. Fresh-water animals are more often preserved. After burial, a fossil is liable to alteration by chemical and mechanical means.

33. *Why do dogs and cats eat grass?*

Both dogs and cats are occasionally seen eating grass. This is not one of their usual foods. Grass is taken by them as a medicine. They know that when their stomachs are not operating properly, the eating of green grass will bring about readjustment.

Animals induce vomiting by eating certain things. Wild bears are said to eat roots and berries at certain times just as we take a cathartic. Animals do indeed doctor themselves.

34. *Which sense is very strongly developed in dogs and why?*

It is the sense of smell which is strongly developed in dogs. By the sense of smell a dog is able to detect strangers and to track men, if specially trained for the purpose.

35. *How many legs has—(i) a scorpion; (ii) a house-fly, (iii) a centipede, (iv) a spider?*

(*i*) 8, (*ii*) 6, (*iii*) about or above 100 (*iv*) 8.

36. *What name is given to the young of (a) an eel (b) a swan, (c) a goose, (d) an eagle?*

(*a*) An elver, (*b*) a cygnet, (*c*) a gosling, (*d*) an eaglet.

37. *What are the main functions of the skeleton of human body?*

The main functions of the skeleton are: (*a*) to give the body a shape, (*b*) to form a support for the body, (*c*) to protect the organs of the body, (*d*) to enable us to move.

The various bones comprising the skeleton are fitted to perform their special functions. Where much work has to be performed the bones are covered by a thick layer of muscles, as in the case of the legs and arms.

38. *Why are the bones of an infant bent?*

Bones are composed partly of soft matter and partly of mineral matter. In the case of infants, soft, matter preponderates. This consists practically of gristle. It is very easy to bend or twist the bones of a child if the greatest care be not taken. If a young child is allowed to learn to walk at too early an age the bones of the legs may be permanently bent.

39. *Of what use is the skin?*

It serves as a protection for the body and also as one of the most important organs of excretion. It collects waste substances from the blood and rids the body of the same. This waste material appears on the skin as sweat.

40. *What is the main function of the lungs?*

Lungs are organs for breathing. Through the thin cell walls of the lungs oxygen passes to the blood and carbon dioxide and moisture pass out of the blood and are expired.

41. *Trace the course taken by blood from the vein through the heart into an artery.*

Blood from the veins (vessels or tubes which convey the blood back to the heart) is pumped into the lungs (*phephre*). There the blood is oxygenated and comes into the left part of the heart. Then it gets into the aorta (the great arterial trunk which, rising for the left ventricle of the heart, sends its branches spreading out through the whole body) and is pumped into the arteries (tubes or vessels which convey blood from the heart).

42. *Name:*

(*a*) *Swimming birds*, (*b*) *birds of prey*, (*c*) *climbing birds*, (*d*) *perching birds or songsters*, (*e*) *diving birds.*

Swimming birds include ducks, teals, geese and swans. They have flattened beaks.

Birds of prey include eagles, hawks, owls, vultures, falcons, kites etc. They have clawed feet and strong, hooked beak.

Climbing birds are comprised of flickers and wood-peckers. They dig into the wood to pick insects by pointed and strong beak.

Perching birds or songsters include swallows, sparrows finches, parrots, flycatchers, warblers, crows, mynah, night-ingale, wrens, thrushes, pekin, robin, black bird (in U. K.) etc. Canary, a popular songster, is the native of Canary Islands.

Diving birds are penguins, auks,. loons, grebes etc. They have short wings.

43. *Name:*

(*a*) *What are carnivores?* (*b*) *What are bacteria?*

(*a*) *Cornivores* are flesh-eating mammals. Dogs, cats bears, racoons, badgers, skunks, seals, sea lions, weasels walruses etc. are some common examples of carnivores.

(I) *Dog family* includes wolves, jackals, hyena, and numerous varieties of dogs.

(II) **Cat family** includes lion, tiger, leopard, panther, cheeta, jaguar, lynx, ocelot and cat itself.

(b) *Bacteria* are the smallest and simplest of all organisms and are devoid of chlorophyll. They exist under all conditions of life and are of tremendous consequence to man as some of them are beneficial and some barmful to him. They thrive on living or dead organic matter. All the unicellular organism reproduce by dividing themselves into two.

44. *Name:*

(*a*) *The largest land animal in the world.*

(*b*) *The largest sea animal and the longest lived animal.*

(*c*) *The tallest animal with long neck.*

(*a*) Elephant. (*b*) Blue whale. (*c*) Giraffe.

45. *Give three examples of each of the following:—*

(*a*) *Hoofed animals,* (*b*) *reptiles.*

(*a*) Ungulates are hoofed (*mammal*) animals. They form quite a large group including cattle, sheep, deer, elk, giraffes, camels, hogs, horses, tapirs, antelopes, hippoptamuses, ιhinoceroses etc.

(*b*) *Reptiles*. Lizards, snakes, turtles, tortoises, gairalis, crocodiles and alligators are some well-known reptiles. Most of them can live in water as well as on the land.

46. *Name the following:—*

(*a*) *The tree that weeps.*
(*b*) *The b'rd that never makes its nest.*
(*c*) *The wingless bird or flightless bird.*
(*d*) *The tree from which wood for cricket bat is obtained.*
(*e*) *The animal that shakes its own tail.*
(*f*) *The most intelligent animal.*
(*g*) *The fcstest flying bird.*

(*a*) Laurel tree on the Canary Island pours water as if it weeps.
(*b*) Cuckoo never makes its nest.
(*c*) Ostrich is a flightless bird of South West Asia, Australia and Africa. It is the largest land bird.
(*d*) Willow is a kind of tree from which cricket bat is obtained.
(*e*) Lizard can shake its own tail.
(*f*) Anthropoid apes.
(*g*) Swift is the fastest flying bird.

47. *Why are bacteria classed among plants?*

48. *Give a comprehensive account of the female reproductive cells of the algae.*

49. *Name :*

(*a*) *The bird which speaks like a man.*
(*b*) *The bird which has no nest.*
(*c*) *The plant or plants which entrap insects.*

50. *What is the difference between mammals and reptiles.*

51. *A lion roars. What do the following animals do?*

(*a*) *A donkey,* (*b*) *a horse,* (*c*) *a monkey,* (*d*) *a cat* (*e*) *an elephant.*

52. *Which are the following animals or plants?*

(*a*) *sponges* (*b*) *bacteria,* (*c*) *yeast,* (*d*) *amoeba,* (*e*) sea *anemone.*

53. *In what respects do algae and fungi resemble and differ from one another? Why are they grouped together?*

54. *Explain :—*

(*a*) *Pituitary gland.*

(*b*) *Haemophilia.*

55. *What are the functions of kidneys?*

56. *Write short notes on skeleton and muscles of human body.*

57. *Give a brief account of the function of the heart and the blood in human body.*

58. *Explain the nature and functions of "ductless glands" in man.*

59. *What do you understand by :—*

(*a*) *Blood pressure,* (*b*) *High blood pressure ?*

60. *Why do leaves of trees fall?*

61. *How is it that, usually, the trees have green leaves?*

62. *Why should we try to know about plants?*

63. *What do you understand by mimicry? Give examples from the animal and from the insect world.*

64. *How does the blood help to regulate body temperature?*

65. *What gases are exchanged by the blood and the cells?*

66. *What is meant by pure blood and impure blood?*

67. *What are dreams?*

68. *What is insanity?*

69. *State briefly what you know about:*

(*a*) *attention*, (*b*) *illusion*, (*c*) *hallucination*, (*d*) *habit*, (*e*) *idea*, (*f*) *memory*, (*g*) *imagination*, (*h*) *emotion*, (*i*) *mood*, (*j*) *sentiment?*

70. *State briefly what you understand by:*

(*a*) *mind*, (*b*) *nerves*, (*c*) *brain*, (*d*) *psychology*.

71. *What is:—*

(*a*) *Introspection*, (*b*) *Objective observation?*

72. *Write a short note on sensations.*

73. *Distinguish between perception and apperception.*

74. *How do we maintain past experience in our mind?*

For answers to questions from 47 to 74 please consult the relevant chapters.

SECTION II

INVENTIONS & DISCOVERIES

CHAPTER 6

ACHIEVEMENTS IN ELECTRICITY

The great sources of power are the movement of air (winds), the falling of water, the expansion of steam and the explosion of gas oil. Electricity in itself is not a primary power. It is generated by water, steam or gasoline engine. All the same, it has a great advantage over other forms of power, because it can be transmitted over long distances by wire and because it can be used in so many ways.

Electricity. It had long been known that two pieces of amber (*umber, raal*) repelled one another after being rubbed with silk and that glass, similarly treated, attracted electrified ember. This was held to indicate that there are two kinds of electricity—positive and negative. In Greek, amber is called *elektron*. Later on, the agency which endowed amber when rubbed, with the property of attracting light bodies, came to be called *electricity*.

The first quantitative experiments, however, were not performed until the time of Colomb, who proved that two electrified bodies attract or repel one another, as the case may be, according to law of force similar to that discovered by Newton for gravitation namely, in inverse proportion to the square of the distance between them and directly as the product of the quantities of electricity with which they are charged.

Notable Advances. With each succeeding year the momentum of electricity's service to mankind increases space. Electricity has been the foundation for progress in many fields. Scientists are devoting their lives to learn additional ways of rendering electricity useful. Without the help of electricity the discoveries made in the production and use of atomic power would not have been possible.

Electricity lights our homes, cooks our food and runs our washing machines, vacuum cleaners, sewing machines and pumps. It toasts our bread, heats our flatirons (irons for smoothing clothes), rings our door bells, moves our fans, operates our oil burning furnaces, and makes possible the radio, the telephone, the telegraph and artificial refrigeration. It lights our streets, public buildings; operates trams, drives industrial machinery and furnishes the spark that makes the gasoline engines run. It lifts elevators, hoists cargoes, operates mines, melts ores and extracts nitrogen from the air. It makes possible search-lights and signals of many kinds adding greatly to the safety of travel by land, sea and air. With the help of radar, an electrically controlled device, aeroplanes and ships are guided in the darkest night or the densest fog. Practical equipment is available for milking, water-pumping, cattle fencing with one strand of charged wire, automatic heaters for old frames, automatic lighting for poultry homes, electric incubators and brooders, etc. In surgery, the electric seering needles and kinves cauterize and stop bleeding.

Electron. According to modern theory, the atoms of all substances are made up of negative and positive electricity. In Greek, amber—a yellowish brown gum that hardens into a stone-like material—is called *elektron*. An electron is a minute particle charged with negative electricity, or a minute negative charge having inertia, normally forming part of an atom but capable of isolation as in cathode rays. Electrons revolve round a central nucleus which is positively charged in very much the same manner as planets move round the sun. They are exactly similar and unthinkably small. The mass of each electron is $9/(10)^{28}$ grams, and the diameter $3/10^{13}$ c.m. They are found to move about quite easily. They can leave one material and go to another or move easily through materials like copper or silver.

Proton. The smallest unit of positive electricity corresponding to an electron, *i.e.*, associated with the same amount of charge but of opposite kind is called proton. It is the nucleus of a hydrogen atom and is nearly 2,000 times as heavy as an electron. Contrary to electrons, protons cannot move easily.

Conductors and Insulators. Some substances allow electricity to flow along them while others do not. Substances which allow electricity to flow along them, *i.e.*, offer little resistance to the flow of electricity, are called conductors, those which do not allow electricity to flow along them, *i.e.*, offer a great resistance to the passage of electricity, are called insulators. As a matter of fact, the terms conductors and insulators are comparative only, there being no perfectly conducting or insulating substance. Different bodies have different powers of conducting electricity, all being intermediate between a perfect conductor and a perfect insulator. Silver, copper, other metals, carbon, acid, water, vegetables, body, etc., are conductors or bad insulators. Cotton, wood, marble, paper, ivory, etc., are partial conductors and partial insulators. Oils, silk, resin, sulphur, ebonite, amber, glass, dry air, etc., are insulators or bad conductors.

Ampere is a common unit of measurement of electric current. It is the amount of current that one volt can send through one ohm of resistance.

Ohm is the unit by which electrical resistance is measured being nearly equal to that caused by a thousand feet of copper wire one-tenth of an inch in diameter. It is named after George Simon Ohm, a German electrician (1787—1854).

Watt. It is the practical unit of electrical activity or power. The term is named after James Watt (1684—1721).

Dynamo. It is machine for generating electric currents by means of the relative movement of conductors and magnets. In other words, it is a machine for transforming mechanical energy into electrical energy.

Flow of Electricity. When two conductors charged with electricity are connected with each other, generally a flow of electricity takes place from one to the other. Water flows from a higher to a lower level. But what does determine the flow of electricity? It is the degree of electrification or what is now called potential. Just as flow of water will not take place unless a path is provided in addition to the difference in

level; similarly the flow of electricity between two charged bodies at different potentials will not take place unless the bodies are connected by some conductor. As soon as they are connected, a flow of electricity would follow.

Grid System (wire network between filament and plate of valve) of electrical transmission utilizes a few large highly efficient generating stations located at points where power can be generated most economically. The electric supply from these stations is passed through step-up transformers which raise the voltage to 1,32,000 volts. It is then fed into the transmission lines. The transmission lines form a network or grid over the whole of the area to be supplied. Step-down transformer are utilised at convenient points to draw supplies from the grid. The supplies are distributed through sub-stations to domestic and industrial consumers.

Electric Bell. An electric bell is operated by an electromagnet which attracts a piece of metal called the armature held at one end by a flat spring and carrying at the other a wire to which a knob of metal is attached, which, when the armature is attracted, strikes the bell. The armature, when it reaches the magnet, ceases to contact a small screw which breaks the circuit through the magnet and releases the attractive tension on the armature. In this way, the armature is alternately attracted and repelled with great speed, causing a continued ringing of the bell.

Electric Eye. Certain metals give off electric energy under the influence of light. The fact was discovered by Heinrich Hertz, a German physicits, in 1887. Science now uses this knowledge to make light produce electric current. And that is the principle of the 'Electric Eye'. A beam of light strikes a metal plate in the 'Electric Eye' (or Photo-tube, as it is commercially kr·own) and produces an electric current. This tube is simply a new type of battery similar to the one in flashlight. When we press the button with our finger to ring a door bell we close the electric circuit and start a flow of electric current which rings the bell. In this new wonder worker (Electric Eye) a beam of light is substituted for the finger and a photo-tube for the dry battery. As soon as anything prevents the beam from reaching the metal plate in the

tube the current stops and this action is used to operate a switch to start or stop other mechanical operations controlled by it.

It may appear unearthly, supernatural, to see that a door opens of itself when somebody approaches the door. But, in fact, there is nothing uncanny in it. That is what the 'Electric Eye' actually does.

As soon as a person approaches the door, the 'Electric Eye' acts as an automatic switch instantaneously. That is a step further to pulling a switch on the way to set the door-opening machinery in motion. The machines which the 'Electric Eye' sets in motion are more often the ingenious inventions.

The description 'Electric Eye' does not do the photo-tube justice. In the first place it is actually twenty times more sensitive to light than the human organ, and consequently can be operated on light beams which the human eye cannot even perceive such as the ultraviolet rays and infra-red rays which we cannot detect in sunlight. For this reason the photo-tube is especially useful in burglar alarm system where beams are used, which the intruder breaks without knowing it. Then its high sensitiveness to light enables it to work on reflected beams which vary with any variation in the colour of object under observation. As for example, if a particular shade of blue cloth is under inspection, any variation in the colour will change the valve of the reflected light beam and act as a breaker.

The well-known bean for baking is one of the many articles inspected by the 'eye'. Uncooked bad beans differ in colour from good ones and consequently are detected by the difference in the reflected beam. Counting solids of any kind as they go by on a conveyer is just a child's play for this device as, likewise, measuring liquids going into a container. Each time when the beam is broken a mechanical counter is set in motion or when the liquid in the container reaches the beam, an automatic valve is closed.

Once the working principle of the photo-tube is fully understood, it is easy to realise that its possible applications are almost endless. It would take volumes to describe its

present uses in advanced countries during the few years it has been available. In the field of sports the winning horse is determined by the 'eye' which instantly clicks a battery of cameras when the first horse crosses a line, or a bowler is disqualified if his foot enters the 'foul' area. Moving pictures owe sound films to the same mechanical magic. The photographic record of the sound of the 'actor' voices or moving film is converted into electricity of varying intensities and the latter into sound fluctuations or the actual sounds heard in the theatre. The 'eye' has been adapted to act as iceberg detector for ships and mountain detector for planes in the event of fog. Light rays which are perceptible to the human eye are reflected back by fog. But the ultra-violet rays which we cannot see, penetrate it and hence they are used to detect obstacles heretofore not discovered until too late.

Fluorescent Lamp has a rod-like glass tube. Inside it is a small amount of mercury. When electric current passes through the glass tube, the mercury gets very hot and changes to a gas. A sort of ray is given off by the gas. The rays, when they strike against a coating of special material inside the glass tube, make the special materials glow. This kind of a lamp uses current less than an ordinary electric bulb.

Magic Eye for Comet Jet Airliner. Comet Jet airliners are to have a radar device fitted in the nose which will give the pilot a warning picture of approaching storm and clouds. Known as the airborne search device, the radar set "screens" any solid objects in the path of the aircraft up to a distance of 40 miles—the approach of a hard core of a cloud, a mountain top or another aircraft.

The searcher has a high-frequency beam which covers a sector of space ahead of the aircraft. It scans through an angle of 75 degrees each second and if the beam hits a "solid" object, signals are reflected back on the radar screen.

Any storm-filled cloud or other object with a "hard" centre in the wedge-shaped sector of space covered by the beam will automatically be screened. Distances are marked off on the screen and the pilot can determine the range of objects ahead within a few hundred yards.

Machines Which Think. "In the Mathematics and Physics Section of the British Associations, a demonstration of 'Reasoning Machines' was given by J. B. Smith, B.Sc., Research Engineer and Dr. M. M. Callum, B.Sc., his collaborator. Two machines built by them in 1951-52 were used. Questions were put to the instruments by plugging the electrical rays, and two rows of lights, one red, one green-flashed, the answers, 'yes' or 'no'. One of the problems put to the machines was: If I am in a carefree mood and have some money, I either visit my Uncle Joseph or else go to the theatre. I can only bear to visit my Uncle Joseph when I am in a carefree mood. If I have no money, I naturally cannot go to the theatre, and in fact I then *have* to visit Uncle Joseph. Tonight, I shall not go to the theatre—shall I visit Uncle Joseph?' The machine made several attempts at the problem, and answered every time that the engineer should visit Uncle Joseph.

'Mechanical Mole.' On February 6, 1952, a Moscow report claimed that a radio-controlled "mechanical mole" which bores its way through ground and can be used in war to plant explosives under an enemy's position has been perfected by a Soviet scientist.

The device is said to have been successfully tested in Ural Mountains. Carrying a crew of two, "the vast rocket-shaped device turned, bored its way rapidly into the Mountain-side and vanished in a few seconds in trial run." Its peace-time use is driving tunnels for pipe-lines and railways.

Incandescent Electric Lamp. *Incandescent* means glowing or white with heat, rendered luminous by heat. The incandescent lamps are based on the principle that a conductor (that which has the property of transmitting electricity or heat) is heated when an electric current passes through it and if the conductor melts at a very high temperature and further possesses a very great resistance. It becomes white hot. In electric lamps, filament (a slender or thread-like object, fibre, the thin conductor in a glass bulb, raised to incandescence by the current) made of tungsten metal is used. Its melting point is about 3,200C., and can be heated to a high temperature.

Fuse is a short piece of wire of high resistance and low melting point inserted in an electric circuit. As soon as the current exceeds the normal load for which the circuit is designed, the fuse wire melts and breaks the circuit. Its object is to prevent too high a current from flowing through the wires, which otherwise might melt on account of heat produced and thereby damage the building. The fuse blows off long before the current exceeds the permissible limit. When the fuse is replaced the current begins to flow through the circuit again.

In a bomb or shell, the fuse is a device for igniting (setting on fire) an explosive charge, such as a hollow tube filled with combustible material protruding out of bomb or shell or a small hammer striking a combustible powder. Time fuses are used chiefly on shrapnel and anti-aircraft shell, and depend upon the rate of burning of a train of power as in the cord fuse, but the fuse is so constructed that it is ignited just as the projectile leaves the gun.

Neon is a gaseous element. It is found in small quantities in the air. From there it is "obtained by the fractional distillation of liquid air." Neon is used in electrical luminous tubes. As it has great penetrating power it is also used for illuminating harbour and landing-fields especially when weather is foggy.

Neon Light. Neon gas is sealed in a glass tube. An electric current is then passed through it which gives a brilliant white discharge.

Television. *Television* means "to see at a distance." It is the electric transmission of visual scenes and images by wire or radio in such a rapid succession as to produce, at the receiving end, the illusion of events occurring at the transmitting end. The underlying principle is to turn the light and shade of scene into mechanized electrical variations, transmit these variations from one place to another by radio transmitters and receivers. These are then amplified and transmitted just like the waves in wireless telephony. At the receiving end these are again turned into electric impulses which are used to steer a light source so as to make it imitate and intensify the

light falling on the transmitting system. The whole image of the object is never actually reproduced on the screen at one instant, but the different points of the whole screen are differently illuminated in a very rapid succession, so that the persistence of vision acts to give the illusions of a steady illumination.

Telegraphy (Electric). *Electricity writes.* In the past signals were flashed from hilltop to hilltop by means of fire, smoke or by means of arms of wood waved from the top of a pole. Messages were sent from ship to ship and from ship to shore by flags. Messages were at times sent by men on foot or on horseback or in horse-drawn vehicles.

Morse first became interested in the telegraphy when he learned that the current of electricity can be interrupted at any time along the wire. He devised a crude instrument and a system of dots and dashes which is practically the Morse Code used today.

By telegraph we mean 'to write at a distance': (Gr. *Tele*, at a distance, such as telephone, television, teleprinter, etc., and *graphein*, to write) by means of electricity. The underlying principle is that of an electric bell. Suppose that a man at station A wants to communicate a message to a person at station B. They have fixed a certain code with the help of which they understand each other. The person at station A presses his key for different durations and sends a complete message. The person at B, the receiving station, having an electric bell connected with the sending station, receives the code words with the help of the bell and interprets them. Similarly the process can be reversed and message can be sent from station B to station A. Actually as an electric bell is not a convenient receiver, other instruments are used for this purpose. A recent form of the receiver is called a *Sounder*.

It may be noted that, ordinarily, in order to complete the circuit two wires are required. But on economic grounds single wire is used. The circuit is completed by using the earth. Although the rocks and stones are bad conductors of electricity, the inner layers of the earth are fairly good con-

ductors. To make good earth connection, the wires at both the stations are connected wth metal plates buried in damp soil.

Telegram is a message sent by telegraph.

Teleprinter. It is a form of telegraph transmitter, with a typewriter keyboard and type-printing telegraph receiver. The operator at the sending station has only to press the key corresponding to a particular key and at the receiving station it is recorded automatically. A teleprinter enables the operator to send more than 60 words a minute, signalling without any strain to the operator and none whatsoever to the receiver. The message can be printed at several stations at the same time. Signalling by hand is becoming out of use and is being replaced by teleprinter. This system is being exclusively used by news agencies and by the police.

Telephone. *Electricity speaks*. The telegraphy made it possible for an operator to cause an instrument many miles away to make dots and dashes on a strip of paper or to produce sounds. Either the dots and dashes or the sound could be at once translated into words. Telephone carries the words themselves from a speaker to the listener. Telephone is an instrument for producing sound at a distance, especially by means of electricity.

Vibration of a diaphragm in front of a magnet generates alternating currents in the coil surrounding the magnet. There is a similar system of diaphragm, a magnet, etc., provided at the receiving end. The diaphragm at the receiving station vibrates exactly at the same rate as the speaker's. The note given out by the receiver's diaphragm is of the same pitch as that impressed upon the speaker's. The quality or tone of note is also reproduced exactly. Thus, the induced currents reproduce exactly the same sound at the receiver's instrument, with the only difference that it is very much weaker and is affected by the natural vibrations of the diaphragm which gives it a peculiar nasal intonation.

It is noteworthy that it is electricity and not sound which goes from one place to another. It is noteworthy also that in a telephone circuit two wires are used and not one as in a telegraph circuit.

Telephone was invented in 1876 by Graham Bell (1847-1922) and is therefore called Bell's telephone.

Telephone Exchange. The lines from each subscriber's instrument are brought to a central place known as Telephone Exchange. Incoming lines and outgoing lines are taken in two separate parts of a switch-board. When a subscriber wishes to communicate with another subscriber not connected directly, he lifts his instrument from the hook and a small lamp lights up at exchange. On ascertaining the telephone number the party wanted, the operator at the Telephone Exchange connects the two parties together. As soon as the second party attends to the call, the light goes off. When they finish their talk and hang up their receivers, the lamp lights up. The operator disconnects the parties. Nowadays automatic exchanges which are complex in construction are coming into use.

Trunk-call is a telephone message or summons by a main or trunk line. It is talking on telephone to a person sitting at a long distance. It is opposed to local calls.

Microphone is an instrument which renders the faintest sounds distinctly audible. It is a device for producing an electric current corresponding in its variations to the variations in air pressure of sound. Microphone is used in telephone transmission for long distances. It is because the earth cannot be used for completing circuit.

The first microphone principle was discovered by Edison and is still the one most widely used. The sound waves fall on a diaphragm, which exerts gentle pressure on an electric contact formed by two or more carbon granules touching each other. The resistance of this contact is approximately proportional to the pressure, provided that the applied voltage does not exceed about two volts. In the best types of microphone, the diaphragm is very thin and rightly stretched and is pressed between a pair of carbon contacts, the effects of which are combined by means of centre-tapped transformer. The carbon microphone is very sensitive, that is to say, it is easy to obtain from it a powerful speech current for a given sound. But the difficulty is that it can never be got perfectly

quiet, but always has its own background of noise. As such, it has great disadvantages when accurate sound recording and broadcasting are required. To get rid of this difficulty the *condenser microphone*, even simpler in construction, but much more difficult to handle, is used. It consists simply of two parallel metal plates, one of which is exceedingly thin and forms the sound-receiving diaphragm. Another form of microphone is called the *ribbon microphone* and consists of a very thin strip of aluminium stretched under low tension between the poles of a powerful magnet. The sound waves falling on it cause it to move *to* and *fro* in the magnetic, whereby voltages are induced in it which can be amplified.

Submarine Cables. These are cables of stout copper wire enclosed in a covering of gutta-percha for purposes of insulation. Outside this is a coating of hemp which is sheathed by a layer of steel or iron wires. Finally there comes a coating of tarred canvas to prevent rusting. Near the coast the cable is specially strengthened. Cables are used for sending telegraphic messages.

Telegraphy (Wireless). In the wireless telegraphy messages are sent from one station to another without the help of wires. A series of electric waves is produced at the sending station. On arriving at the receiving station these waves put into action a telephone producing long or short sounds corresponding to dots and dashes of the Morse Code. When a condenser is discharged across a spark gap, a part of the electric energy is radiated out in space as electric waves. The number of times the spark occurs in one second is called the spark frequency or note frequency. This frequency is generally 500 or 1,000 a second. When a series of spark passes the gap, an oscillating current is produced in the circuit and a similar current is induced in the aerial which radiates our energy as a train of electric waves.

The equipment at a receiving station is practically the same as at a transmitting station. As soon as the electric waves sent out by the aerial—a conductor (elevated wire) which sends out or receives electric waves of the transmitting station —meet the aerial of the receiving station, they set up in it electric oscillations, which induce oscillations in the coupled

circuit which consists of a condenser and a coil. Both the circuits are adjusted so as to be in tune with the sending station. As the induced oscillation currents are too rapid for the diaphragm of the telephone to vibrate, they are detected suitably by a detector.

Radio or Wireless Telephony. *Electricity speaks.* In wireless telegraphy messages are sent with the help of a transmitting circuit containing spark gap, using the international code of dots and dashes, but in wireless telephony or radio, actual speech or music is broadcast. This is done by producing the continuous oscillation or carrier waves by means of thermionic valve, regulating (modulating) these waves and putting them on air, reflecting them from the upper part of the atmosphere and, at last, receiving and detecting the waves at the receiving station. Radio waves are similar to light waves, but they are very much longer. Waves longer than 600 metres are called long waves. The radio waves follow the curvature of the earth, but light waves do not. That is why one hears speech from London, but cannot see London. The radio waves go out into the atmosphere as well. Thus, we have ground waves and sky waves. When the reflected waves or the ground waves reach the aerial of the radio receiving set, they are extremely feeble, particularly when they come from a distant station. With the help of thermionic valve they are suitably amplified.

As radio waves from various broadcasting stations cut the aerial of the receiving set at one and the same time, it is necessary to cut the waves from all other stations except the one from which it is desired to hear the programme. This is done by tuning the aerial circuit to the frequency of the incoming waves or of the transmitting circuit.

The essential parts of a radio-set are an aerial, a high frequency amplified unit, a detector which may be a crystal or valve, a low frequency amplifier unit, and a loudspeaker or earphones.

SOS stands for "Save our souls". It is a wireless call for help sent by vessels in distress at sea, or planes in the air. The call consists of three dots, three dashes, three dots.

Relay. When the distance over which a message is to

be sent is very great the current becomes too weak to work the sounder. The apparatus by which the current of the receiving telegraphic station is strengthened is called a relay. It is an electro-magnet having a coil of very fine wire. The weak current which comes from a distance is made to pass round the electro-magnet. Consequently, the armature of relay is attracted. In this way the weak current brings about a strong local current which works the sounder.

Overseas Radio Telephone Service means the service transmitting message across seas from one country to another through the beam wireless system. The important measures adopted in this regard are (*i*) the installation of the secrecy gear, and (*ii*) any private telephone owner can use the service for an overseas call on paying necessary fees.

Radio-activity. It is the power or property possessed by certain substances, such as radium, of giving off rays which can penetrate opaque (not transparent) matter; the power of producing photographic or electrical effects by a process identical with or analogous to radiation.

Radium was discovered in 1898 by Madame Curie, a famous French scientist. It is a rare element the radiation of which acts upon sensitive plates and have properties like X-rays. Approximately, a total of it costs Rs. 18 lakhs. Radium is known to be more than 3 million times as radio-active as uranium. Radium constantly produces a gas called radon. It is this gas, instead of the radium itself, that is commonly used in curing diseases. Every day that radon is produced it is pumped off from the radium salt. It is collected in tiny capillary tubes of glass called needles, which are then inserted in the flesh near the cancer. The rays given off kill diseased tissue much faster than healthy tissue. It is here that the curative power of radium lies.

X-rays. The discovery of X-rays by Rontgen in 1895 was one of the most important discoveries of modern times. X-rays are a type of invisible rays. A striking property of these rays is their great penetrating power. They are deflected neither by a magnetic nor by an electric field. They produce fluorescence after passing through a book of 1,000 pages. Thick blocks of wood or ebonite do not prevent this action. These rays also pass through thin plates of copper, silver,

lead or gold. The power of their penetration depends upon the density of the material, the denser, the material, the smaller is the thickness through which X-rays can penetrate. This difference in power of penetration has rendered X-rays of immense value in surgery. When X-rays are passed through our body, the shadow of the bones on the fluorescent screen is dark, while that of the surrounding flesh is very faint, because the bones are denser and stop X-rays more effectively than the flesh. In case we substitute a sensitive photographic plate for the fluorescent screen, a photograph can be taken. This photograph, better known as *radiograph*, helps the surgeon to carefully localise a bullet, a foreign body, etc., embedded in the flesh. X-rays have further enabled physicists to investigate the surface of crystals and the arrangement of atoms in molecules, etc. Unfortunately, X-rays possess a property which, though entirely harmless to the patient, may be fatal to the physician.

The nature of X-rays has been a mystery for a long time. But now they are definitely known to be extremely short waves. The X-rays are produced when cathode rays strike against a target made of a heavy piece of tungsten of platinum. They are sometimes called Rontgen rays, after the name of Mr. Rontgen, who discovered them.

Atomic Age. Atomic age is something new so far as human knowledge is concerned. But, in a sense, the atomic age dates back to the days of creation. The light and heat of the sun and stars are of atomic origin, and it is to that light and heat that all life on the earth owes its very existence. As scientists discovered the vast stores of energy in the atom and learned the manner in which that energy is released, they found for the first time the reason for the enduring heat of the sun. They came to the conclusion that the same chain of reaction that takes place when atomic energy is released in the laboratory is all the time going on in the sun and is the source of its heat and light.

Man-made atomic energy differs from that coming to us from the sun in that the source may be built up in compact form and transported to any place where it may be needed. Moreover, this man-made energy may be released with explosive force, or, as is confidently expected, it may be

released with just the force desired, be it great or small. Although this man-made energy is of the same kind as that received from the sun, it lends itself to special uses far beyond the possibilities of the sun's heat and light.

Atom. By an atom we mean the smallest portion of an element which can take part in a chemical reaction. All bodies with which we are familiar can be split up into smaller and smaller parts. They are composed of minute particles of matter which do not touch each other. These minute particles are called molecules. Each molecule is composed of atoms which may be two in number in simple cases like the molecules of hydrogen, oxygen, table salt; but many in other cases, *e.g.*, in case of blood a molecule is composed of about two thousand atoms.

Source of Atomic Energy. Uranium and Thorium are probably the only natural substances which can be used as sources of atomic power. Substances whose atoms can be split are known as *fissionable materials*. One form of uranium can be changed to Plutonium—an element not formed in nature. Plutonium, like uranium, is fissionable and is used for the production of atomic energy.

Production of Atomic Energy. The structure of the atom is very much like the structure of our solar system. In the centre of the atom, corresponding to our sun, is the nucleus consisting of two parts—the proton and the neutron. Corresponding to the planets of the solar system are the electrons which move at great speeds about the nucleus (central mass round which matter gathers). The number of electrons differ in different elements. The possibility of dividing or splitting the atom was discovered in 1939.

When a nucleus of the atom (uranium) is split, it gives off certain particles and tremendous amounts of energy. If the flying particles from a divided atom can be made to hit and split other atoms, the process is repeated automatically again and again. The greater the number of atoms divided, the greater is the amount of energy released. In the case of a bomb explosion the whole process takes place in an instant of time. When a fire is lighted, the process of burning goes on automatically and heat is generated so long as the burning

continues. The heat thus generated is the result of chemical action. In the case of chain reaction of atomic or *nuclear* energy, as it is sometimes called, the energy released is not the result of chemical action but is due to changes that take place within the structure of the atom. To put it simply, the matter is changed to energy.

The chief characteristic of a chain reaction is the tremendous amount of energy released by "burning" or use of small quantities of fissionable material, or fuel Some two pounds of uranium generate the same amount of heat as a result of splitting of its atoms as obtained by burning 3,000 tons of coal.

Atomic Power. In harnessing atomic power man has tapped a source of energy the possibilities of which seem to be almost unlimited. Up till 1936 the subject of atomic energy was more or less of academic interest, because the energy released in an atomic reaction was much less than energy spent in releasing it. During the period of preparation for the last World War atomic research work got the foremost attention. A good deal of success has been attained since then. Russia and America are the main countries which are carrying on research work of atomic energy at their top-speeds.

Atomic power, besides serving only as a means of destroying life and property, when harnessed for commercial purposes, will be a great source of power. So far big industries could mainly be located near sources of power such as coal, hydro-electricity; but, henceforth, with the help of atomic power, they will be located anywhere. The abundance of energy lying dormant in a few pounds of atomic fuel makes the transportation of the source of power a very simple matter. But in using the atomic energy great care has to be taken to protect the workers. Atomic fuel when "burned" gives off rays which are extremely dangerous to life and health. The accumulation of fuel must be surrounded by a wall of cement at least five feet thick. Under the present conditions the need of such heavy protection renders the use of this power impossible in the operation of automobiles or aeroplanes.

It is expected that atomic energy, or at least the rays given off by fissionable material, will be of use in medicine. The

rays of nuclear matter may serve the same or similar purposes as now provided by radium or X-rays.

Atom or Atomic Bomb, is a bomb in which the explosion is caused by a sustained neutron chain reaction (*i.e.*, a self-propagating reaction) resulting from the fission of nuclei or atoms of uranium or its derivatives. To make the chain reaction successful there is a critical size of the uranium or plutonium lump, smaller than which does not support the chain reaction. As such, it is usual to take two lumps each less than critical size, but together larger than this. As soon as they are brought together an explosoin results.

The first atomic bomb consisted of a mixture of pure uranium 235 or plutonium with graphite. It is said that about 700 crores of rupees were spent on research labour and equipment for making the atomic bombs which were thrown on the city of Hiroshima in Japan. In this case the two parts of the bomb were brought together by an internal gun which shot one part as projective against the second part as target. The destructive power of atom bombs, as it is given out, is enormous. The fall of Japan has been attributed to two relatively small bombs, one of which exploded in the air. It is reported that the killed and the injured numbered about 1/3rd of the population and about half of the buildings of the city were destroyed. The nature of the atomic bomb is being kept as a guarded secret.

The Sun Engine. For more than a century, engineers have been trying to capture the free-for-all sun's energy and to convert it into some handy form for mechanical power. They have been claiming designs of such engines, in 1913. Schuman, an American engineer, worked steam engine with concentrated heat from the sun. In 1935, Gomes Sola, a Spanish inventor, fired a steak in his sun-energy machine within a few minutes. At the instance of British Government who are eager to add to the national fuel sources, an extensive research was carried out at the Imperial College of Science and Technology in London to harness the energy of the sun. They may succeed in producing machines running on solar energy. In case of success tropical countries will benefit very much. It is, however, not expected that big power-houses will produce electricity directly from the sun heat. But it is believed that

the solar energy will work refrigerators and air-conditioning plants and that machines will be adapted to supply heat to cooking-stoves.

Radar. It is an electric path finder. Radar is the technique of ascertaining the relative position in space of a reflecting object, such as an aeroplane, a radio-pulse being broadcast and the direction of arrival and the time-delay of the reflection giving the required data. The word 'Radar' is formed from the initial letters of the words 'Radio Detection and Ranging' (determining the distance and direction of an object.

Scientists directed short electric waves (electro-impulses) towards the moon and in a few seconds detected similar waves which were reflected from the moon. This was an electronic "echo". Electronic waves travel in straight lines and with the speed of light. As such, it is possible to learn the direction and distance of the object from the observer. Knowing the speed of light, and the time for the echo to reach the observer the distance of an object is easily calculated. If a short sound is made near, say a hill, an echo is heard after some time. Now suppose the hill is covered with fog and we do not know its exact position. By directing sharp short sounds at various angles, the direction of the hill can be determined by noting the direction which gives the loudest echo. The distance can be determined by measuring the time between the original sound and the loudest echo. In the case of cities and aeroplanes, the distances are relatively short and the time is measured in small fractions of a second.

In radar, radio waves of extremely short-wave lengths and hence of high frequency known as micro-waves or radar-waves are used. The radar equipment consists of (*i*) a short-wave transmitter to give out instantaneously a series of radio waves, (*ii*) a short-wave receiver to receive and reflect waves and measure the time taken by waves in their journey to and back from the invisible object and (*iii*) a rotatable antenna which sends out waves in the direction in which it is pointed and receives back waves from the same direction.

Radar is used to detect and determine the distance and

direction of enemy aircraft and ships. During the last war it developed to a very great extent. The war in the air and the battle with U-boats were won with the help of the radar. It served as an eye to the aviator, to the ack-ack gunner and to the ship's navigator. It tells of the approach of enemy planes long before they can be seen and protective measures can be taken, and counter offensive air raids over Britain were rendered ineffective, so much so that there was a time when within twenty-four hours 232 German planes were brought down. The anti-aircraft gunners picked up the enemy aeroplane with radar, followed it along its course, and as soon as it entered the field of sight of the gun, the gun fired automatically.

Radars detect submarines. The radar-equipped aeroplanes can detect the presence of a submarine on the surface (radar does not see through water, from a distance of more than 30 miles). Even through clouds, when the aeroplane cannot be seen by the submarine crew, radar is able to spot the U-boat and bomb it before it has time to go underwater. In case, however, it dives, the location having been determined, depth bomb can hit the submarine.

In the World War II many a Japanese ship were sent to the bottom of the South Pacific Ocean by bombing them from above the clouds where they could not be seen by the enemy. The Japanese had not perfected radar.

Radar guides not only aeroplanes in their flight and indicates the location of landing fields but also shows the location of storms which the pilot is able to avoid by changing his course. The operator of radar equipment at an airport learns the location of an approaching aeroplane long before it arrives at the airport. If clouds, fog or darkness blot out the course of the aeroplane, the operator guides the pilot all the way to the field by radar and gives instructions as to when and how the aeroplane should be landed.

Radar warns aeroplanes and ships of any obstructions in their paths. Ships are thus warned of the presence of other vessels or of islands and headlands towards which they may be approachi

An aeroplane equipped with an "automatic" fight

controller can take off, cross even the ocean and can make a landing with no hand touching the controls from start to finish.

Welding is a process by which two pieces of the same metal are joined without the intervention of a second metal; the two pieces to be welded are pressed together, and a sufficient electric current is passed between them to generate locally a very high temperature.

Lightning Flash. Since long man has been observing thunder and lightning—atmospheric electricity—in comparison with man-made electricity. It is found that the lightning flash is of the same shape as the elongated spark and that it follows the path of least resistance and, therefore, appears zigzag. Lightning is an electric discharge taking place either between two clouds charged with opposite kinds of electricity or between a charged cloud and the earth. The charged cloud and the earth's surface below it may be regarded as two coatings of a condenser and the intervening air as the dielectric (nonconducting). By induction the earth and other bodies below get charged with the opposite kind of electricity. As soon as the strain becomes too great for the air, a discharge passes. The discharge assumes either of the two forms:

(*i*) forked lightning, owing to less resistance offered by some parts than others, and hence giving rise to a zigzag flash, or

(*ii*) sheet lightning which is probably a reflection from the surface of clouds of a distant discharge. In this case, the direct lightning is hidden by an intervening cloud or horizon. The brightness produced by lightning is similar to sunlight, although actually it appears much less.

Lightning Conductor. It is generally observed that there are lightning conductors at the top of churches, high buildings, etc. They protect buildings from the destructive effect of lightning. The idea was first suggested by Franklin. A lightning conductor is made up of three parts:

(*i*) a rod of copper or of galvanized iron with a

pointed and projected end above the highest point of the building;

(*ii*) an iron or copper rod or a flat strip connecting conductor No. (*i*) with the ground, and

(*iii*) a good earth connection. The action of a lightning conductor is twofold. Firstly, it becomes charged with the opposite kind of electricity by induction and sends up a stream of oppositely charged dust and air particles to neutralize the cloud and, secondly, in case a discharge takes place it allows the discharge a path of least resistance to the earth, without damaging the building.

EXAMINATION QUESTIONS

WITH BRIEF SOLUTIONS

1. *Describe briefly for a layman how a telephone works.*

The battery (apparatus for producing electricity) with which the receiver is connected by wire sets up an electric current and when we speak in the transmitter the vibrations made by the sound waves of our voice agitate the carbon disc and the current flows to the line wire. The currents are transformed into vibrations and sound waves of speech by iron disc (a thin circular plate) of the receiver.

2. *Compare and contrast the telephone and telegraph services as means of communication, from the point of view of general public. Give an example where the use of one method is more suitable than the other.*

The telephone and telegraph have each their own limited utility. Telephone permits the sending and hearing of actual human speech, whereas by telegraph a large number of messages can be automatically and rapidly sent over one single line. In the telephone only two persons can use one line at one time. Moreover, in case of telephone, a considerable amount of time is lost in calling up the person wanted, the telephone far supersedes the telegraph, especially when modern arrangements guaranteed that everything sent over the wires remains confidential.

3. *How can a message be sent to a person on board a liner in the ocean?*

All large vessels are fitted with wireless telegraph installations. Many of the most up-to-date ships have wireless telephones. Messages can be exchanged with all ships fitted with similar apparatus. Messages can also be sent to or received from the shore. Special arrangements exist for sending wireless messages through any telegraph

office and by special arrangement any telephone subscriber can be connected to a ship's telephone at sea.

4. *Trace the course taken by a current from the battery through the switch into an alarm-bell.*

As soon as the button is pressed the circuit (the act of moving round) is completed and the current passes into the electro-magnet of the bell. This causes the striker to be pulled back, which breaks the circuit and releases the striker which then strikes the gong (an instrument of call).

5. *What is the advantage of using high transmission voltages?*

The High Transmission voltages enable very large amounts of electrical energy to be transmitted over comparatively thin wires with the minimum of electrical losses.

6. *How does electric supply reach the private consumer from the Grid?*

At the transformer station a tapping is taken. At this stage the voltage is stepped down from 1,32,000 volts to a valve suitable for transmission by underground cables, usually 11,000 volts or 6,600 volts. At this voltage it passes to a sub-station where the voltage is still further reduced suitably.

7. *How does electricity travel?*

Electricity travels in wires of metal by conduction, through space by radiation and in solutions by a kind of convection (the process of transmission of electricity or heat through liquids or gases by means of currents).

8. *Why does an electric bell ring when the button is pressed?*

Wires from electric cell pass to the bell and back to the cells. There is a break in the wires beneath the bell-push. When the button is pressed, a piece of metal bell closes this gap and completes the electric circuit. A current then passes through the bell and causes it to ring.

9. *Why does the filament of an electric lamp glow when the current passes?*

The filament (*nah jalne wali barik taar*) has a high resistance. When the current passes through it, it gets heated and on getting white hot, gives out light.

10. *What will you examine first if all the electric lights in your house suddenly go off?*

The main fuse should be examined first.

11. *Describe briefly how a switch operates on an electric light bulb.*

The switch is a device to connect the wires of the lamp with the wires of the electric battery such that when it is on, the circuit is completed and the current passes to the lamp, and when it is off, the current is broken. As the current passes, the filament of the lamp is heated to incandescence (white heat, *roushani*) because of the resistance it offers to the current.

12. *How are the following caused:*
(*i*) *Lightning and* (*ii*) *thunder?*

(*i*) Lightning is a discharge of electricity between clouds or between clouds and the earth.

(*ii*) Thunder is the noise caused by and following a flash of lightning.

13. *During a storm, why is the lightning followed by a clap of thunder?*

The thunder is due to the sudden disturbance of the air caused by a violent discharge of lightning. The sound and the flash are simultaneous, but as sound travels much more slowly than light, it reaches us some time after we see the flash.

14. *What is wireless?*

Wireless is the system of sending electrical and telegraphic signals without connecting wires.

15. *What is meant by wave-length?*

It is the distance from any point on one wave to the corresponding point on the next wave.

16. *How does an atomic explosion spread havoc?*

Atomic explosion spreads havoc in three main ways. Much of the energy liberated is transformed into intense heat (with a temperature of scores of thousands of degrees centigrade at the core) which causes abrupt enormous expansion of the surrounding mass of air, when explosion is located considerably above the ground, and thus creates a conventional blast-wave that travels outwards in all directions from the centre of explosion. Owing to the immensity of the blast-wave, even giant buildings are pressed down and blown off, and indeed whole small town lying below may turn aside. Another large part of the energy gets away in the form of heat rays which burn and set ablaze all susceptible materials, such as sun-rays do when brought to a focus through an ordinary piece of lens. By far the deadliest effects, however, are a kind of extremely penetrating, short-waved X-rays, gamma rays which either kill living beings outright or destroy the bone-marrow which supports the body's anti-infective mechanism, leaving one defencelss against microbic infections.

17. *How does the explosion of a uranium or plutonium bomb give rise to prolonged radio-activity in its vicinity even for a great number of years?*

It was observed by a French scientist, Joliot, in 1934, that when a pencil of neutrons, protons or other nuclear issue impinges upon substances with sufficient intensity, these substances become radio-active ("artificial" radio-activity) and maintain their radio-activity long after the original exciting causes have ceased to operate. It thus happens that nuclear radiation during a uranium explosion brings about this "artificial" radio-activity, which persists thereafter and may render the affected localities unfit for human beings.

18. *What is Silent Radio?*

Silent Radio is a convenient arrangement for listening in without disturbing others. It was invented by Mr. C. M. R. Balbi or Richmond.

19. *What is an incubator?*

Incubator is an apparatus by means of which eggs are

hatched artificially.

20. *What is the derivation of the word "electricity"?*

21. *What is the purpose of having fuses in an electric circuit?*

22. *What are the essential parts of a radio-set?*

23. *What is a submarine cable?*

24. *Explain how a lightning conductor works.*

25. *Show that electric energy whether generated by steam or water-power comes from the sun.*

26. *Why are birds not electrocuted on electric wires?*

27. *How can a photograph be wirelessed?*

28. *What elements lend themselves to the production of atomic energy?*

29. *Why is atomic power a matter in which every nation of the world is vitally interested?*

30. *What are some of the possible peace-time uses of atomic power?*

31. *Explain the prinicples behind:—*

(*i*) *Wireless transmission and reception.*

(*ii*) *Generation of electricity.*

32. *What is an electric eye?*

N.B.—For answers to questions 20 to 32, please consult the chapter.

Chapter 7

SCIENCE OF MOTION

Mechanics is that branch of science which deals with the state of rest or motion of bodies. It may also be defined as a branch of science that deals with the action of force or forces on matter.

The ancients' knowledge of levers and other elementary machines was co-ordinated by Newton and amplified by his own discovery of the laws of universal motion and gravitation. Descartes and Leibnitz translated the principles into mathematical formulae. *Dynamics* is the branch which treats the forces in motion: *Statics* is that field of mechanics which deals with forces in equilibrium.

Power (strength, energy), is the mechanical rate at which energy is exerted or work is done. Mechanics' power is the work it can do in a unit of time, commonly measured by horse-power (H.P.)

Power comes from air, directly as wind, or compressed; water, directly or converted into electrical energy: fire directly as heat, or steam, or electrical energy produced indirectly by motion actuated by fire and steam. Power may be used where produced, or transmitted by various devices.

Energy. A clear conception of the nature of energy is due to Robert Meyer, a German physician. He stated the doctrine of the *Conservation of Energy* in 1842: "The quantity of energy in the universe is constant; none is ever destroyed or created."

Energy is divided for convenience into two forms—potential and kinetic. *Potential energy* is energy stored in a motionless system, as in cases when a weight is raised above the surface of the earth, a spring stretched, two substances such as carbon and oxygen separated, electrical energy stored in a condenser, and so on. *Kinetic*

energy is energy of motion, and is contained in a moving mass, or a beam of radiation. The transformation of one kind into another is never accomplished without the 'degradation' of some part of the energy into low-temperature heat, which can be retransformed into some other kind of energy, only if a means of allowing some of it to flow away at a still lower temperature is available. Modern civilization depends for its existence upon sources of available energy.

However, it has recently been shown that mass and energy are not two entirely separate and distinct entities, but that energy itself has mass.

Wave is a rhythmic undulation in any medium, commonly used of the surface disturbance of water. Wave is also used to describe the movement of electricity, light, radio and sound. Length of wave is distance from a fixed point on one wave to a similar point on the next. Velocity is measured by the rate at which a wave is travelling; frequency by the number of crests that pass a given point in given time. In water waves, the movement of the drops of water is up and down: in sound waves, the motion in the wave is back and forth in the direction in which the wave is travelling. Light is made up of different colours of different wave-lengths; the red waves are the longest and the violet the shortest.

Motion is movement or the process of changing from one position to another place. Copernicus was the first to deduce principles regarding movement of the earth and Galileo, in the 16th century, regarding movement of falling bodies. Newton in his *Principia* gave the first fundamental conception of relative motion of bodies.

The Laws of Motion. The laws of motion were first clearly enunciated by Newton.

First Law. Everybody continues in its state of rest or of uniform motion in a straight line except in so far as it is compelled by the impressed forces to change that state.

Second Law. The rate of change of momentum is proportional to the impressed force and takes place in the direction of the force.

Third Law. To every action there is an equal and opposite reaction.

Propeller. Propel is to drive forward, to urge onward by force. Propeller is one who, or that which, propels revolving mechanism for driving machinery, ships, aircraft, etc.

The screw propeller reverses the principle of the windmill. In the windmill the motion of the air exerts pressure on the sails. But in the propeller air or water is set in motion when power is applied. The idea is to produce a reaction upon the propeller, transmitted through its shaft and tending to drive the propeller and whatever is attached to it in a direction opposite to that in which it is driving the air or water. He who can swim knows it very well. In a practical case, the air or water is driven in one direction, while the plane or ship travels in the opposite direction.

Force is any impulse, whether push or pull, which changes the state of a body's motion either starting it out of a state of rest, or accelerating, or checking or halting or deflecting or reversing its previous motion.

Water-Power is obtained from the energy of falling water. The use of wooden water wheel has been common since long. Modern hydro-electric plants derive mechanical power from the turbine, a type of water wheel to drive electric generation.

Water-Wheel is a wheel turned by falling water, the energy of which it converts into mechanical power. In an *overshort wheel,* water flows into compartments at the top. In an *undershort wheel,* the force of the fall is applied at the bottom. In a *breast-wheel,* the fall of water is applied near the centre. The modern turbine is a wheel increased in a flume containing vanes which direct the water and increase velocity by building up pressure.

Horse-Power is the standard unit of power for measuring the generating power of an engine. It is equal to 746 watts or as computed by James Watt, 33,000 ft. lbs. per minute, a figure determined by his observation that a powerful work-horse could raise a weight of 33,000 lbs. one foot in one minute.

Erg is the absolute unit of energy used in Physics. An erg is the work done by a force of one *dyne* acting over a distance of one centimetre.

Velocity is the rate at which a body moves along a particular line.

Acceleration is the rate of change of velocity.

Matter is a term in Physics. Whatever occupies space and can affect one or more of our senses is called *matter*. For instance, wood, stone, oil, steam, etc., are all different kinds of matter. Matter is found to exist in three states—solid, *e.g.*, bread; liquid, *e.g.*, water and gaseous, *e.g.*, the air. A solid neither changes its shape nor size nor do its particles move apart. A liquid, on the other hand, has no shape of its own. It may take any shape in which it is placed. A gas has neither shape nor volume of its own. It takes up the shape of the vessel containing it and fills it up completely. The hand can be moved far freely in a gas than in a liquid.

Mass. The quantity of matter in a body is called its mass.

Weight. The downward force due to the attraction of the earth acting on a body is called its weight.

Generally, there is a confusion between mass and weight of body. Mass, as already stated, is the quantity of matter in a body, and remains the same at all places, while weight is the gravitational pull of the earth on a body, and it differs at different places due to the change in gravitation. In weighing one seer of cotton we find that the masses of one seer weight and one seer of cotton are different although their weights are equal.

Elasticity (*lachak*). When external forces are applied to a body, generally it undergoes a change either in volume or in shape. As soon as these forces are removed, it tends to recover more or less its original condition. Some of them recover completely while others retain a permanent change in them. The bodies which tend to recover more completely are called more elastic.

Fly-wheel is a heavy wheel whose inertia maintains a nearly uniform speed of rotation under variable load or driving force. The revolving wheel is a reservoir of energy

by virtue of its power of momentum, and its effectiveness depends on the amount of energy which it absorbs or gives up for a given change of speed. The fly-wheel is used to steady the motion of all piston-driven stationary engines, and carries the motion over the 'dead point'.

Valve (*suraakh ka dhakna jo sirf ek taraf khule*). A valve is a device for regulating the flow of fluids and, in an extended sense, the flow of electricity and other analogous flow. Valves are either self-acting or are actuated by external means. Most self-acting valves are non-return valves. They are opened by the pressure of fluid in one direction, in which they allow to pass, and close of themselves, or by the motion of the fluid in the other direction.

Safety Valve is an automatic device to relieve pressure in hydraulic systems, steam boilers, etc., to prevent their explosion. A safety valve may be—

(*i*) a dead weight, a weight placed directly on the valve;

(*ii*) a lever which regulates the pressure escape by means of suspended and adjustable weight, and

(*iii*) a spring, fastened to the top of the valve and regulating the pressure by the act of springing back or rebounding.

Piston of an engine or pump is a device of cast iron or aluminium which moves backwards and forwards within an enclosing cylinder, as the cylinder receives or discharges gas, fluids or steam.

Gearing is the means by which motion is transmitted by direct contact from one rotating part to another but frequently extended to cover other means, such as belts, chains and hydraulic pumps, which transmit power from one part of a machine to another.

Gears are toothed wheels used in transmitting motions in machinery.

Internal Expansion Brake. An internal expansion brake consists of a circular metal strip, generally of steel, inside a drum fixed to the wheel. As soon as it is desired to stop the motion of carriage, this strip is made to expand by means of a

lever control. Thereupon, it presses against the drum all along its inner surface and the friction thus produced arrests its motion.

Automobile is a vehicle propelled by an engine within itself or by any other means of power in itself. Literally the word *automobile* means self-moving. In 1769 Nocolas Cugnot, a French scientist, made first-known successfully self-propelled vehicle.

Now almost all motor vehicles operate by means of internal combustion gasolene motors. The power developed by the motor is transmitted to the transmission by means of a clutch. The function of the clutch is to permit car to remain at rest while the motor is running. Clutches are of various types; but the one most commonly used is called the disc type. The transmission receives the motor power from the clutch and transfers it to the driving mechanism housed nearly at the rear axle. The transmission is a gearbox capable of changing the motor force either into reverse action or into various intensities for forward motion. This capacity of the transmission enables the operator, by means of a gear-shift lever, to deliver the amount of power needed to the rear axle without overstraining the motor. A drive-shaft carries the power to the *differential*, a gear-box which transforms the power at right angles to both axle shafts and thence to the rear wheels. The differential supplies equalized amounts of power to both wheels at all times, even when one is moving faster than the other as in rounding a corner. Other items of equipment on automobiles are the steering apparatus, by which direction is imparted to the wheels, and the electric system which starts the car and provides lights and the spark which explodes the fuel.

Motor-cycle is a bicycle propelled by an engine of internal combustion type. Motor-cycle was developed in 1895 to 1900. They are now built with four cylinders, with 3—7 horse-power. They have self-starters and a gasolene capacity of 1½—2 gallons, which is sufficient for about 200 miles. A motor-cycle of 5 H.P. can travel about 100 miles an hour.

Motor-car. Functions of its important parts:—

Carburetter converts petrol into a gaseous or finely

divided state to form with the air an explosive mixture for generating power.

Radiator is a net of tubes with large radiating surface for cooling the circulating water in a motor-car.

Ammeter measures the strength of current in amperes on a graduated scale.

Clutch is a mechanical device connecting the motor with the machinery which it is required to drive. In the automobile it is used to connect and disconnect wheels and the motor, so that the car may be stopped or started at a moment's notice.

Calorimeter measures in thermal units the heat liberated or absorbed.

Gear-box couples the engine to the shaft by stages.

Battery supplies the electricity for sparking the gases in the cylinder.

Differential allows for different speeds of the wheels while rounding corners, etc.

Magneto, a small machine in a motor-car engine which provides electricity for the ignition of the gases in internal combustion engines. High tension magnetos consist of two coils on the same armature.

Flywheel. The fly-wheel which is caused to whirl rapidly by the piston during sparking, keeps the piston moving after the sparking and clears the cylinder of waste vapours or smoke.

Steam Engine consists mainly of two parts:

(1) the boiler in which steam is generated and

(2) the engine proper in which steam is allowed to expand and work. The capacity of a boiler to make steam depends on the area of its heating surface. When this area is increased the flames are made to pass through a large number of metal tubes varying in diameter from two to four inches immersed in water. The steam formed is allowed to rise to a high pressure and is then led through pipes placed in the fire tubes before it is admitted to the steam chest. Thus, the steam is superheated. From the steam chest, steam is allowed to pass

into the cylinder. The piston moves up. The upward motion of the piston causes the fly-wheel to rotate. The fly-wheel is fixed to the crank-shaft and enables it to move smoothly without a jerk. When the piston reaches at the top steam above, the piston pushes the piston down. When the piston moves down, the dead steam from below is driven out. The process continues to repeat, the steam acting on both sides of the piston alternately working it upwards and downwards in the cylinder. An engine in which the steam acts on both sides of the piston is called reciprocating or double acting, while the one in which steam acts on one side is called single acting.

Steam Turbine. It is not simple to produce motion by means of a jet of steam issuing from a nozzle, but to do so with an efficiency comparable to that of the piston engine. In practice the pressure must be very high, in order to obtain a reasonable quantity of available heat in a given bulk. When the steam expands through nozzles to drive a turbine (a kind of wheel revolving on a vertical axis, and impelled by the pressure or impulse of water on its water), the energy stored in it is converted into kinetic energy of motion. The turbine utilizes this kinetic energy as completely as possible. The steam in the turbine is used to drive a wheel by falling against the vanes attached to its circumference.

Internal Combustion Engine. Petrol and Diesel engines are known as *internal combustion* (burning) engines. In a steam engine or a steam turbine the fuel is burnt under a boiler outside the engine. The working substance *i.e.*, steam is then conducted to the cylinder. In the case of a petrol or diesel engine the fuel is burnt in the cylinder of the engine itself and the hot products of the combustion (a burning) are themselves the working substance. The steam engine or turbine is an external combustion engine. The internal combustion engine is better than the steam engine. It is lighter and occupies less space, because there is no boiler. It has no smoke. There is no loss of heat similar to that which occurs from the boiler or the steam pipes. It can be started easily. It utilises about 25 to 40 per cent of the available heat, whereas the steam engine converts about 12 to 18 per cent of heat into useful work. The invention of the internal combustion

engine has brought about a great revolution in the methods of locomotion. The aeroplanes and automobiles owe their successful working to these engines.

Petrol Engine. In petrol engine a mixture of vapour from petrol and air is exploded in the cylinder by an electric spark.

There are two valves at one end of the cylinder. One of them is an inlet valve which admits into the cylinder a mixture of the petrol vapour and air, the other is called an exhaust valve which allows the burnt gases to escape into the atmosphere. There is a spark plug inserted into the cylinder to burn the mixure. In order to start the engine the crank-shaft is turned by rotating a handle. The piston moves outwards and sucks in a mixture of petrol vapour and air through the valve in the cylinder.

This stroke is known as the *charging* or *suction stroke.* When the cylinder has sucked in the petrol vapour and air, the inlet valve closes and piston moves inwards compressing the mixture of petrol vapour and air to about 1/5th of its original volume. This is known as *compression stroke.* During the compression stroke both (the inlet and exhaust) valves remain closed. As soon as the compression stroke gets near its end, an electric spark is produced by the sparking plug. The mixture of petrol vapour and air explodes. As a result of this explosion the piston is driven outwards and imparts energy to the flywheel. This stroke is known as the *explosion* or *working stroke.* The fly-wheel, while rotating, pushes back the piston. The burnt gases are turned out of the cylinder through the exhaust valve and exhaust pipe. This is the fourth stroke and is known as the exhaust stroke. This process repeats itself.

Motor-car and Aeroplane Engines. In this case petrol engines are used. But it is not possible to carry about high fly-wheels in motor-cars, lorries and aeroplane engines. As an alternative, four, six, eight or twelve cylinders are used to drive the crank-shaft. The cylinders are so arranged as to give power to the crank-shaft one after the other. As the explosion takes place inside the cylinder, naturally the valves, the piston and other working parts will get heated and cease to work properly. The cylinder itself will get so hot that the

gaseous mixture when admitted into it will explode immediately. With a view to avoiding it, a water jacket is provided round the cylinder. Water is kept circulating in this jacket, which keeps the entire set-up cool. In the case of aeroplanes the engines are air-cooled.

Diesel Engine is an internal combustion engine. It is more efficient and cheaper than petrol engine. There is less fire risk in a diesel engine. Further, it is more reliable than petrol engine, because there is no electrical arrangement for ignition—the least reliable part of the petrol engine. The engine was invented by Rudolf Diesel in 1895. Like petrol engine, diesel engine is four-stroke engine. The process of working is similar to that of petrol engine already described.

Speed Control. The motive power in a locomotive is steam. Superheated steam under high pressure enters the chamber enclosing the piston and drives the piston out. When the piston has gone its full length, the used-up steam escapes through an opening at the other end and the piston comes back to its original position. This process is repeated over and over again. If more steam is allowed to enter the cylinder, the pistons and hence the engine would move faster. Thus if you regulate the supply of steam you would regulate the rate of working of the engine. This is done by means of a regulator, known as *governor*, worked by a long lever-arm fixed in front of the driver. By moving the lever up or down, less or more steam is allowed to go to the piston-chambers and hence the speed is decreased or increased.

Similarly, in a petrol-driven engine, the motive power is supplied by sparking the petrol-charged air in the cylinder. The sudden explosion thus produced pushes piston down and thus drives the car. Thus if you regulate the supply of petrol-charged air to the cylinders, *i.e.*, regulate the supply of petrol to the carburetter where the air is mixed with petrol vapour, you would regulate the speed of motor-car. This you will do by pressing or removing pressure from the accelerator, *i.e.*, increasing or decreasing the supply of petrol into the carburetter.

Motor Boat is a boat usually small. It is propelled by a gasolene engine or any engine using the principle of internal combustion.

Electric Motor. Following on the pioneer work of Faraday, an American scientist, Mr. Henry, invented the electric motor in 1832.. The invention made available a new source of industrial power as an alternative to steam and, later, to internal combustion. It was some 50 years later that the invention was sufficiently perfected to be put to practical use. A tremendous increase in industrial electrification followed.

Slot Machines are machines operated by coin, or in some cases by tokens similar to coins, and used for selling commodities on services automatically. *Slot* is a hollow, narrow depression to receive some corresponding part in mechanism, an opening for the insertion of coins in automatic machines.

The power to operate the machine may be derived from three sources: the customer, the weight of the coin, or a clock or electric motor. In the first case, the coin is usually made to serve as a link in the mechanism, the gas and electricity slot meters and many types of cigarette and sweetmeat machines are examples of the use of this method. The most elaborate types of machines are fitted with coin selectors, which pass a coin through a series of tests for its diameter, weight and thickness, and rejecting those under or over in these respects. Other machines are operated by the weight of the coin alone, which in falling into the till (money-box, counter) supply sufficient power to release the mechanism. Automatic machines have been adopted in connection with telephone service.

Elevator is a hoisting machine or lift to raise persons or objects to a higher level. They are operated manually, hydraulically or electrically. Modern elevators which are run almost entirely by electric motor, have automatic safety devices and are stopped automatically at floor levels by an electric microdrive machine. Grain elevators have elaborate machinery to move and store grain. They are of large capacity.

Tractor is a self-propelled machine. It is an important power-unit in agriculture, road-building and general construction. Formerly, it was driven by steam now commonly run by internal combustion engine using gasolene.

The smaller type of wheeled tractor is widely used for draw-in ploughs, seeding and harvesting machinery, and also furnishes belt power when converted into a stationary engine. The crawler or caterpillar type runs on an endless chain with broad facings which offer powerful grip in soft or extremely powerful grip in soft or extremely rocky ground.

Bicycle Pump. Pump means a machine for raising water and other fluids to a higher level: a machine for drawing out or forcing in air. The object of a bicycle pump is to compress air into the tube of a bicycle. The bicycle pump is a compression pump. It consists of a barrel in which a piston moves up and down. A leather washer slightly larger than the diameter of the barrel is fixed to the disc of the piston with a nut. When the piston is raised up, air rushes down the space between the rim of the washer and the wall of the barrel into the space below. During the down-stroke the increased pressure of the air below the piston presses the rim of the washer against the wall and opens the valve of the valve-tube. It is this valve-tube through which the compressed air enters into the rubber tube of the bicycle. This compressed air in the bicycle or motor-car tyres, being elastic, guards against the shocks encountered on rough roads.

Water-pump. It is a machine used for raising water. It is made up of long vertical iron pipe reaching water level in the earth. At its upper end there is a valve which opens upwards into a barrel. There is second valve in the piston which also opens upwards. The barrel has an outlet through which water passes out. In the first few strokes, air below the former valve is exhausted. When the piston at the bottom of the barrel is raised, a partial vacuum is caused above the lower valve. Now, as the pressure at the lower surface of the lower valve is greater than that on the upper surface, the valve opens upwards allowing the air in the pipe to enter the barrel. As a result of this expansion the presure of air in the pipe is reduced. The atmospheric pressure below at the bottom of water consequently forces some water up the pipe. During the course of down-stroke the air in the barrel is compressed. On account of this increased pressure the lower valve closes and the upper valve opens upwards and allows the air in the

barrel to escape into the atmosphere. In subsequent strokes more water is forced into the pipe. The air in the pipe is removed in a few strokes and the water is pushed from the lower valve into the barrel. From there, with the help of washered piston, water is thrown out.

Sometimes we find that water cannot be obtained from a water-pump unless we pour some water at the top. It so happens because of mechanical imperfections. By pouring water the valve and leather of the piston are swelled and consequently made air-tight.

EXAMINATION QUESTIONS

WITH BRIEF SOLUTIONS

1. *Why do we find it easier to travel ten-mile distance on a bicycle on a level road than to walk the same distance?*

It is so, because in cycling the work is done against friction only, but in walking a man has to raise the weight of his whole body each time he takes a step.

Moreover, the friction of the road is comparatively small, because the wheels have to roll on the ground and do not slide. The friction of the wheel upon their bearing is decreased by the use of ball-bearings.

2. *What is the 'gear' of a bicycle?*

By the "gear" of a bicycle we mean that diameter which the rear-wheel should possess so that the bicycle may go in one revolution the distance which it actually travels in one round of pedals.

3. *Why is petrol used for driving motors?*

Petrol, unlike paraffin oil, very readily turns into vapour. By means of an electric spark this vapour is made to explode. These explosions, which follow each other in rapid succession, are directed upon the piston, which is thus made to move. The rapidity with which petrol turns into vapour makes it necessary to keep the petrol in sealed tins. This also explains why it is so dangerous to bring a naked flame anywhere near petrol.

4. *How are the cylinders of a motor kept cool?*

The cylinders are kept cool by means of water which circulates round them. The hot water passes through a coil of pipes called a radiator, which is found in the front of a car, and the cold air which meets the car rushes between them, thus cooling the water, which can be used

over and over again. In the case of motor-cycles, rings of metal in contact with air carry off the heat, which then radiates from the surface of metal.

5. *What is a carburetter?*

The carburetter is the part of motor which enables the petrol to be turned into vapour. Air is drawn into the carburetter and mixes with the petrol spray forming an inflammable vapour. This is drawn into the cylinder of the engine, where the vapour is exploded. The resulting force is used to drive the motor.

6. *What will happen if in driving a motor-car across a stream (i) the exhaust pipe or (ii) the inlet pipe is submerged in water?*

(*i*) The exhaust gases will gurgle out of water.

(*ii*) In case the inlet pipe is submerged in water, water may enter into the cylinders and stop the egine.

7 *Who invented the steam-engine and when?*

The first practical steam-engine was invented by Thomas Savery in 1698. The engine merely sucked up water. The first steam-engine with a cylinder and piston was invented in 1705. James Watt provided a separate condenser, which made the steam-engine economically efficient. This happened some sixty years later.

8. *Trace the course taken by petrol from the tank through the carburetter into the cylinder.*

From the tank the petrol goes into the sediment-catcher where the sediment (what settles at the bottom of a liquid) is removed. Thereafter it goes into the carburetter (an apparatus for changing gases with carbon) and is mixed with the air. The air saturated (soaked) with petrol goes into the cylinder.

9. *Why do you slip on wet pavement but not on a dry one?*

There is a greater amount of friction on dry pavement than on a wet one.

10. *Why does an electric fan go round?*

It rotates on account of the couple of forces acting on the armature.

11. *Describe briefly how the free-wheel in a bicycle*

. The free-wheel is the toothed wheel fixed to the hub of the rear-wheel. This is an arrangement so designed as to move the rear-wheel only when the pedals are pushed forward. If the pedals are turned in the reverse direction the outer part of the free-wheel turns *freely* without turning the rear-wheel. It further enables the pedals to remain at rest when the rider so desires, while the rear-wheel and hence the bicycle continues to run.

12. *Explain fully the means by which the speed of a locomotive is controlled. Name the corresponding mechanism of a petrol-driven motor-car.*

13. *Describe in simple terms the use and method of functioning in a motor-car of (i) gear-box, (ii) differential, (iii) battery, (iv) radiator, (v) carburetter, (vi) calorimeter, (vii) clutch, (viii) armature.*

14. *What is the use of a fly-wheel in a motor-car?*

15. *What is a magneto?*

16. *How does a motor-car work?*

17. *Describe an internal combustion engine.*

18. *Explain the principle of a steam-engine.*

19. *How is power produced and transmitted in (i) the internal combustion engine, (ii) the steam engine?*

20. *Explain briefly how Diesel engines work. What are their special advantages?*

21. *Explain the principle behind internal combustion engine.*

22. *What is elasticity?*

23. *What is more highly elastic : rubber or steel? And why?*

24. *Why does a tennis-ball bounce higher in Murree than it does in Dacca?*

N.B.—For answers to questions from 12 to 24 please consult the chapter.

CHAPTER 8

MISCELLANEOUS TOPICS

Sec. I—Gravitation and Magnetism

Gravitation is the attraction of the earth for bodies on its surface, and more generally the attraction of every body for every other body. This attraction is universal. Newton stated the Law of Gravitation as "*Every body in this universe attracts every other body with a force which varies directly as the product of the masses of the two bodies and inversely as the square of the distance between them.*"

Magnet. A body which possesses the properties of attracting small pieces of iron and steel and of pointing due north and south when freely suspended is called a magnet. It was on account of the last property that a magnet was called *lodestone* (a stone or ore of iron that attracts pieces of iron) or leading stone for it could be used to steer a ship. As it was in Magnesia, a province in Asia Minor, that in ancient times, an iron ore which had the peculiar property of attracting small pieces of iron was first found, it was called *magenite*.

Magnetism is the property by which certain substances attract other substances. Examples are lodestone, iron, steel, nickel, cobalt. Pieces of lodestone will naturally attract each other and if suspended freely in the air, will point south and north. A substance having this property is called a *natural magnet*. *Artificial magnets* can be made by bringing iron or steel into contact with the natural magnet, lodestone, from which it acquires magnetism.

Magnetic Poles are two points on the earth's surface where the magnetic force is exerted directly downwards. The magnetic north pole is on Boothia Peninsula in North Canada. The magnetic south pole is on the Antarctic plateau, west of Rose Sea. The exact position of the magnetic poles vary from time to time.

Mariner's Compass (*Qutab-numa*). A mariner is a seaman or sailor. Compass is an instrument consisting of magnetised needle used to steer ships, etc., the needle indicating on a card the absolut direction at any given time. The element with which a sailor is mainly concerned while steering his vessel is the declination. The true geographical latitude and longitude may be determined by astronomical observation, but that is something tedious. Therefore, the steering of a ship is performed with the help of a magnetic compass. The compass usually employed consists of a flat circular disc of aluminium or mica on which a scale is pasted or drawn. On its under-surface are secured four to eight magnetic needles thereby giving a system of high magnetic moment. In many modern compasses the card is floated on methylated spirit. It takes most of the weight of the needle point. The liquid helps in reducing the oscillations of the compass which would otherwise be troublesome. The card is divided into four parts, N., E., S., and W., each of these parts being further subdivided into two, giving N. E . S. E., S. W., and N. W. Again each of these eight parts is divided into two, giving sixteen parts, which are further subdivided into each giving in all 32 parts. The officer-in-charge of the ship who uses the compass in steering is provided with a map on which the declination of all the important places is specified. With the help of both the map and the compass the ship is steered accurately.

Gyro-Compass. It is a compass which indicates direction by the freely moving axis of a rapi y spinning wheel—owing to the earth's rotation, the axis assuming and maintaining a north and south direction.

Until recently, magnetic compass was the only instrument used by sailors to steer ships. But now-a-days the gyro-compass is also being used especially in submarines, within whose enclosing shell of iron the mariner's compass does not work

Sec. II—Sound

Sound is vibration of the particles of air propagated as a wave which affect the organs of hearing. The direction of vibration is the same as that of propagation. Sound cannot

pass through a vacuum. We perceive sound vibrations over a range in frequency from about 20 to 30,000 per second, and recognize the differences between sounds of various frequencies as differences of *pitch*. Most sounds come to us through the air, which at sea level transmit vibration at a speed of 1,100 ft. a second: but sound is conveyed more readily and at greater speed by water and solid bodies. An important consequence of the wave nature of sound is the phenomenon of *beats*, which are caused by the interference of two sounds very nearly equal in pitch. The *reflection of sound* produces a great many familiar phenomena. Every one is familiar with *echoes* and these find an important practical application in sounding at sea. Sound mirrors give a concentration of sound, or produce a parallel beam in manner analogous to the use of concave mirrors for light. On passing from one medium to another, sound is *refracted*. When sound waves fall upon any kind of object capable of vibrating with a natural frequency equal or nearly equal to that of the waves, we have what is called *resonance* (*goonj, sadaa*). When vibrations follow at regular intervals, sound is called a musical note. Noise is a jumble of irregular vibrations.

Echo is a reflection of sound, after an interval of time, from a solid object. It is produced by waves of compression or rarefaction in the air. The sound is reflected at right angles to the surface. *Echo* was a mountain nymph in Greek legend, who, as a punishment, was made speechless, except to repeat the last words of others. She fell in love with Narcissus and pined away except for her voice.

Sounding is the method of ascertaining from a ship the depth of water beneath it. In shallow waters the depth is measured by using a string to the end of which weight of lead is hung. For greater depths a sounding machine, in which a lead is attached to a steel wire carried on a reel, is used. The specimen of the sea bottom is obtained by sending down with the lead a tube which opens on striking the bottom and is closed when the lead is wound back. Sounding at great depth requires that the ship should be stationary.

Echo sounding is a modern development depending upon observation of the time taken by a sound signal sent

from the ship to travel to the bottom and return to the ship after reflection. For moderate depths the apparatus can be made to give a visual indication of the depth on a dial, on which a flash is thrown when the sound is received from a source of light which is set moving from zero at a steady rate when the sound signal is sent. For great depths the sound signal is receiving by head-phones, the observer watching a revolving light which passes zero when the signal is received.

Singing. *How is singing produced.* The act of singing involves the production of tone of musical quality by means of the lungs. The lungs force air up through the windpipe past the larynx (the upper part of the windpipe, the throat) where the vocal mechanism is situated. The total quality of the sound produced depends on the control of the supply of air, which in turn depends on the control of the muscles of the diaphragm by which the lungs are inflated. In the larynx itself are the vocal cords. The passage of air is interrupted by them, thus causing vibration. The vocal cords can regulate the size of the opening through which the air passes and the number of vibration and consequently the pitch is governed by the vocal cords.

A good voice requires thorough training in breath control and good physique, while the production of tone of fine quality is affected by the position of the head and tongue and the use of the lips. The voice is trained by means of exercises and scales which may consist of various vowel sounds sung to sustained notes throughout the singer's range. Flexibility of voice is acquired by practising exercises of ever-increasing complexity.

Talkies, as they are popularly called, are *cinematograph films* accompanied by simultaneous sounds of the human voice, musical instruments, etc. In most cases the sound record occupies a very narrow band near one edge of the picture film. It consists of minute, dark and light bars, which in their passage through the projector interrupt a beam of light thrown on to a photo-electric cell, and cause fluctuations of electric current which are magnified and transformed into sound.

Sec. III—Heat

Heat is a form of energy. It is produced from other forms of energy. Mechanical energy produces heat when two bodies are rubbed together as between the bearings of a machine or at the brake of a car or when there is rapid movement. Electrical energy produces heat when the filament of a lamp turns red and white hot. Chemical energy produces heat when coal is burned. The primary source of heat is the sun. Heat in turn may be converted into other forms of energy.

Flame is a phenomenon resulting from the action of combustion of gases. The outer part of flame is dark, it being the unburned gas. The inner centre is similar. Hydrogen gas is practically colourless; carbon monoxide produces flame. *Why is there light in a flame?* The cause of the light given by a flame is the presence of particles of incandescent matter.

Thermometer (*Miqias-ul-hararat*) is an instrument for measuring temperatures. It was invented by Galileo in 1592. It has since been greatly improved. The name of Fahrenheit is specifically noteworthy in this respect. The form of thermometer in general use is a glass tube marked with a scale and partly filled with mercury. Increasing heat causes the mercury to expand and rise on the tube. Upon cooling, the mercury contracts and descends. The temperature is indicated by the position of the scale of the mercury column's top. By the Fahrenheit (F.) scale, water freezes at 32° and boils at 212° above zero. By the Centigrade (C.) scale, water freezes at zero and boils at 100° above. By the Reaumur (R.) scale, water freezes at zero and boils at 80° above.

Clinical Thermometer. It is used to measure the temperature of the human body, which in the normal conditions is at 98.4°F. Clinical thermometer is a quick-acting and short-range (95°F—110°F) maximum thermometer. When it is placed in the armpit or below the tongue of a person the force of the expanding mercury pushes the mercury thread past the constriction, but when it is removed from there the column breaks as there is vacuum above the mercury column and as

such there is no force to push it past the constriction. As the column beyond the constriction stays where it was, the temperature of the patient can be read at leisure. To get back the mercury into the bulb and make the column continuous, the thermometer is jerked twice or thrice.

Cooling caused by Evaporation. Evaporation takes place at the free, exposed surface of water. The drier the air the more vapour it will require for saturation. It is for this reason that wet clothes dry more quickly on a dry day than on a rainy day, although the temperature on both days may be the same. Whenever evaporation takes place, heat required for the change of state is always taken from the surrounding objects if not supplied from outside. If you take bath on a hot day, you feel your body cool afterwards. It so happens because the water on your body in evaporating uses some heat from your body. We find so many applications of this principle. The refreshing effect produced on a hot day by watering a road is due to the cooling produced by evaporation of water. The pores in the earthen pots allow the water to come out to the outer surface where evaporation takes place and thereby cold is produced and hence the water remains cold. That is why new earthen pots with fresh pores are used in summer. If you fill up a canvas bag with water and hang it outside a running train on a hot day, you will find that in spite of the fact that the bag has been exposed to the sun, the water inside it becomes very cool. It is on account of this phenomenon that localities adjoining sea neither get very hot in summer nor very cold in winter.

Refrigerator, *i.e.*, the production of low temperatures, is due to the rapid evaporation of a liquid like ammonia. The machines used for the production of artificial cooling are known as *Refrigerators.*

Refrigeration (*Taskin-i-hararat*) is the process of producing cold artificially. The production of low temperature is due to the rapid evaporation of a liquid like ammonia. The machines used for this purpose are known as *refrigerators*. They are used either to maintain a chamber at low temperature, for strong perishable articles like fruit, etc., or to keep tanks of brine well below 0°C for the manufacture of ice.

The first refrigerating machines made use of the cooling effect or *compressed air* when allowed to expand and do work. The first machine of this kind is said to have been constructed by Gorrie in U.S. in 1841. Nearly all machines now-a-days work with ammonia, or carbon dioxide, but a few use sulphur dioxide, ethylchloride. The principle in all cases is the same. The working substance goes round a circuit which includes a compressor pump, a condenser, cooled by water, which removes the heat resulting from compression and causes the substance to condense, and an evaporator, where the liquid substance evaporates under the suction of the compressor. In so doing, it abstracts heat from water which is to be frozen.

Thermos Flask (*Flask*, a bottle; *thermos*, for detecting changes of temperature). It is essentially a glass vessel with double walls, the space between the walls being vacuum. The inner surface of the outer wall and the outer surface of the inner wall are silvered. The vacuum does not allow conduction to take place, because there is nothing which might conduct heat, and the polished surfaces minimise the effects due to radiation. To make the effect of radiation still less the glass vessel is further surrounded by a polished cover. As such, the substance maintains its temperature for a considerably long time in a thermos flask.

Sec. IV—Liquids and Gases

Liquid is one of the three forms in which matter can exist. All liquids have certain properties which make them distinctive in their form. They have a definite volume but no definite shape. They take the shape of the receptacle holding them. They flow like gases and they can occupy a space only equal to their volume. Neither do the liquids expand like gases nor can they be compressed into a space smaller than their normal volume, for liquids exhibit very little compressibility. They change to gas when heated to their boiling point and to solids when cooled to the freezing point. Different liquids have different boiling and freezing points. They are useful as solvents, specific liquids taking specific substance into solution.

Free surface of a liquid at rest is horizontal. That is why we do not find any parts high in free surface of a liquid. Thus,

water has a tendency to move down to places which are lower in level. This sliding down will continue so long as there is a difference in level. It stops only when the surface is horizontal. It is another property of liquid at rest that their thrust is always perpendicular to surfaces in contact with them. The liquids transmit pressures equally in all directions. There is not only downward thrust or pressure exerted by the liquid at a point inside it but also there exists an upward pressure at a point which is just equal and opposite to the downward pressure. A body immersed in a liquid loses as much weight as the weight of the liquid displaced by it. A body loses weight when weighed in water, because water has an upward thrust. This fact was noticed by Archimedes.

Archimedes' Principle. It states that *when a body is immersed in a liquid it experiences an upward thrust equal to the liquid displaced by it.* It was Archimedes who, while he was taking his bath in a tub of water, first observed that bodies lose in weight when weighed in water. It happens because the body is on the whole pushed upward by the liquid all round and the amount of push is equal to the weight of the liquid displaced. This upward thrust is called *buoyancy.*

Floating Bodies. Place a body in water or some other liquid. It will displace a part of the liquid which may be greater than, equal to, or less than its own weight. The body will float in water with a part of it above the surface, when its weight is less than the weight of water displaced. This is what happens in the case of a ship. Its hull (frame) is so shaped that the weight of steel and other parts together with the weight of the cargo and air inside is equal to the weight of water displaced.

A fish by means of distension (swelling, stretching in all directions, of the air bags in its body) can change its volume without increasing its weight appreciably and thereby increases the upward thrust on it. Thus, whenever a fish desires to move upwards from the lower depths of water to the surface it swells the air bags.

A whale weighing tons on land, weighs considerably less in water, because its weight is reduced by the weight of

water displaced by it. That is why it can be dragged so easily from the water.

Submarine. Literally, the word means *under* or *in the sea.* Submarine is a ship or a boat so designed that ordinarily it floats on the surface of the sea but can be submerged in water when desired. This is done by varying the specific gravity of the submarine. In the lower part of the submarine are placed compressed-air bottles and on either side are placed ballast (heavy matter employed to give a ship sufficient immersion in the water, that which renders anything steady) tanks. Ordinarily these ballast tanks are full of air and the specific gravity of the submarine is less than water. The result is that it floats on the water like other ships. As soon as it is desired to sink the submarine below the surface, the ballast tanks are filled with water. The submarine becomes heavier than the water displaced and begins to sink. The submarine can also be made to dive to any depth. When it is desired to come up to the surface, the water in the tank is forced out. This is done by sending the compressed-air from the compressed-air bottles into the tanks through a pipe. The bottles are again filled with compressed-air when the submarine comes on the surface.

On the surface, diesel engines are used to propel the submarine and it can sail at a very high speed. While under water it is driven by electric motors using power from large storage batteries. A pressure gauge on the side of a submarine enables the captain to know its depth below the surface.

The U. S. Atomic Submarine. The Westinghouse Electric Corporation of America was reported to have been building secretly a power plant for America's first atomic submarine. The atomic submarine was stated to have been equipped with electric motors capable of operating in hot, radio-active water. Such motors were encased to water-tight, stainless steel to prevent leakage of radio-active matter. One of the model motors underwent tests for high shock. The other model, a smaller unit, was reported to "have been operating for 13,000 continuous hours under conditions of full load, temperature and pressure." The motor under test for shock was reported to have withstood five blows of relatively severe

intensity without any visible or operational damage.

Lactometer. Lactometer is an instrument for measuring the quality of milk. By lactometer we determine the density of milk correctly. Different substances have different densities. One cubic foot of iron is heavier than one cubic foot of water. Mass per unit volume of a body is called its density. Pure milk has specific density. By floating the lactometer in milk to be tested we can find whether or not the density is that of pure milk. An addition of water makes milk lighter and lowers the density which can be easily detected by lactometer. In cases where fat constituents, which are lighter, have been removed from the milk the lactometer does not help us. The skimmed milk becomes heavier, and water can be added safely to make its density equal to that of pure milk. Therefore, it is only on determining both the amount of fat and specific gravity that one can determine the real quality of milk.

Hydrometer is an apparatus for measuring the amount of water vapour present in the atmosphere.

Waterspout is a column of water lifted by a whirlwind over an ocean, or like, connecting the sea with the cloud. When winds of different temperatures meet in the upper atmosphere, a heavy cumulose cloud with a whirling motion takes place. The partial vacuum in the centre of this whirling cloud draws the water from below until it joins the main part of the column, which is composed of vapour and rain from the cloud itself. Water-spouts are sometimes 300 to 400 feet high, but they are of short duration.

Gas. It is a state of matter having neither shape nor volume but having the possibility of indefinite expansion or diffusion. Cold converts gases into liquids or as solid state. Heat converts solids or liquids into gases. Air is composed of nitrogen and oxygen gases.

The actual discovery of gas was made by Jean Batiste Van Helmont, a sixteenth-century alchemist. He observed that when coal burned away, it left only small residue of cinders and that the rest of the coal disappeared in a volatile form. "The spirit that is contained in vessels, but that cannot be reduced to a visible body, is called by a new name *Gas*," Van Helmont wrote.

Mr. Van Helmont took the name (gas) from the German word 'chaos' because he suspected gas to be in the confused state of original matter. Later observers found that gas behaves in a well-regulated manner and not as Van Helmont supposed.

New Motor-car Fuel. Liquid petroleum gas called "L. P. G." has been discovered as a new "dry" fuel for petrol engines. It is stated that when the new gas is used there is found no sludge in the sump, no carbon deposit on the pistons and no burning of sparking-plug points. The new fuel, it is expected, will treble the life of the engine and of the sparking plug. The gas reaches the cylinder as a dry gas.

Oxygen is a colourless, tasteless, odourless gas. It reacts with all metals and non-metals and forms oxides. Oxygen is necessary for combustion and breathing. This is the only gas which supports life. When we breathe, the oxygen in the air reacts with the carbon in the body and forms carbon-dioxide which is exhaled. Heat is generated in this reaction and keeps the body warm and living.

Hydrogen is a gas which in combination with oxygen produces water. It has the distinction of being the lightest substance known. Hydrogen is colourless, odourless and tasteless. It occurs naturally in the atmosphere to a minute degree. It is also formed in the free state in some natural gases and in volcanic emanations. In the combined state it is very widely distributed in enormous quantities, one of its principal sources is water which is the oxide of hydrogen.

Hydrogen is required in enormous quantities for various industrial processes, principally hydrogenation and the manufacture of ammonia, and for these purposes other methods have to be employed. The purest product is obtained by the electrolysis of water which is rendered conductive by dissolving in it small amounts of an electrolyte. This process is economically possible only if cheap electric power is available.

Tear Gas is a gas which causes tears to flow. It is not injurious but extremely uncomfortable. It attacks the sight and smell organs, causing the victim to close the eye and seek fresh air. Tear gas is used for dispersing riotous assemblies and for compelling the surrender of armed criminals.

Smoke is a general name for a dispersion of exceedingly fine particles of solid through a gas. Technically, the term 'smoke' is often applied to mists which are dispersion of fine particles of liquids. Smoke is commonly emitted whenever incomplete combustion of organic material takes place, the particles consisting of carbon and tar. The production of smoke represents a waste of combustible matter, quite apart from the nuisance which it causes. It is not possible to prevent altogether the emission of smoke when boilers are fired with coal. But it can be reduced to a great extent in modern furnaces.

Anemometer is an instrument for measuring the force, velocity and pressure of the wind.

Barograph is a barometer which records automatically variations of atmospheric pressure. It has long pointer which traces in ink a continuous record of the atmospheric pressure on a sheet of paper marked with horizontal lines to indicate pressures, and vertical lines to show the days and hours of the week.

Barometer(*Miqias-ul-hawa*) is an instrument for determining atmospheric pressure. It was invented in 1643 by Torricelli, an Italian. There are now various forms of barometers. The most common barometer consists of a glass tube closed at one end, containing mercury, and placed upright, closed end up, in an open vessel. The weight of the mercury causes it to descend until a sufficient vacuum occurs within the tube above it to suspend it at a position which fluctuates with the variations of the atmospheric pressure.

The barometer is used in weather forecasting. Falling barometer, caused by lowering atmospheric pressure, indicates storm. Barometers are also used in various fields of scientific work, and in aviation to indicate altitude.,

As we go up, the density of the atmosphere, say, up to a height about 1 to 10 miles, is called *trotosphere*. In this part the temperature falls as we go up and the winds blow and the clouds are formed. Above this part, the temperature remains constant and the air is found calm and quiet. This is called the *stractosphere*.

Forecast of Weather. This is done with the help of a

barometer which changes in weather. The principle underlying the science of Meteorology (that branch of Physics which treats the phenomena of the atmosphere as regard weather and climate) is that damp air is lighter, and as such exerts less pressure than dry air, the temperature etc. being constant. The barometer, when it stands high, shows that there is very little water vapour in the air and hence there is very little or practically no chance of rain. The barometer indicates fair weather. When barometer falls, it indicates that there is a lot of water vapour in the air and the chances of rainfall are greater. It is only the experts who, on being supplied with sufficient data regarding air pressure, wind, etc., from a number of stations, can exactly say that (*i*) a falling barometer indicates the approach of rain or storm, (*ii*) a rising barometer indicates the approach of fair weather, and (*iii*) unchanging high barometer indicates settled fair weather.

Sec. V. Optical Instruments and Moving Pictures.

Light is a form of energy which stimulates the organs of vision, producing sight. According to Newton's *corpuscular* theory, light consisted of infinitely small particles passing through space at a high rate of speed. The Dutch philosopher, Hygen, described light as waves of energy projected through the medium of luminiferous ether. Another theory, known as Electromagnetic theory, is advanced to explain the nature of light. The theory ascribes to visible light a specific range of wavelength, and considers it as a form of radiant energy.

White light, such as sunlight or light from an ordinary electric lamp, is composed of seven wavelengths whose colours are given by one word V I B G Y O R *i.e.*, violet, indigo, blue, green, yellow, orange and red, the seven colours of a rainbow. When such a light falls on a glass prism, the emergent beam is not only deviated from its path due to refraction through glass but also is spread out into continuous coloured band which consists of all the seven colours. This band is called spectrum and this phenomenon of spreading away of component of light is called dispersion. Within the limits of certain wavelengths, electro-magnetic radiations produce sensations on the human eye. Outside them they do not.

For example, the rays beyond the violet end of a spectrum, called the ultraviolet rays and those beyond the red end of the spectrum, called infra-red rays are invisible to human beings.

Light travels at a rate of about 1,86,000 miles per second. The velocity of light varies and its direction changes in passing through various media. The phenomenon of refraction is demonstrable in glass. Three types of refraction can be achieved by various shaped lens: plain *refraction* which merely redirects the light wave: *focussing*, which brings several waves to a point to form an image; and *diffraction*, in which the wave of mixed light is split up into its primary spectruum colours.

Light can be transformed into other kinds of energy such as electricity, heat, motion and magnetism.

Light-speed: New Estimate. According to the theory of Dr. L. Essen, of the National Physical Laboratory, light travels 11 miles a second faster than was hitherto believed. The new figure is 1,86,982 miles a second instead of 1,86,271 miles which was established in 1635 by Michelson.

Optics (*Ilm munazir-o-mubadaya*) is the science dealing with light. There are two divisions: physical and geometrical. The former treats of the eye, its anatomy, functions, defects etc., while the latter deals with lenses, mirrors, refractions and reflections thereby produced.

Eye. From an optical point of view the eye is practically a photographic camera with a lens possessing an automatic adjustment for focus in front and a sensitive film consisting of a network of nerve fibres at the back. But there is an important difference between a photographic camera and an eye. In a camera we do focussing by changing the distance of the lenses (a piece of transparent substance with one or both sides, convex or concave, the object to refract rays of light really or apparently radiating from a point, and make them deviate so as to pass or travel on as if they had passed through another point: the crystalline humour of the eye) from the plate, whereas in the case of an eye the focussing is done by changing the curvature of the surfrce of the lens, keeping fixed the distance between the lens and the retina.

Retina is the inner and sensory layer of the wall of the eyeball, a membrane delicate and transparent. It receives the image or impression of sight which it transmits to the brain by means of the optic nerve.

Vision (*Nazar*). When the rays of light from an object enter the eye, they are refracted thrice: one at the surface of cornea, secondly, at the surface of the lens, and, thirdly, when the rays of light emerge from the lens and enter the vitreous humour whose refractive index is equal to that of aqueous humour. When all those refractions have taken place, an inverted image is formed upon the retina, but we interpret this inverted image as if it were erect.

Lens is a segment of glass or other transparent material, usually circular, of which one surface at least must be curved. In photography a lens or series of lenses is used to refract the luminous rays. They proceed from an object and produce an image of that object. The rays are thrown on a flat sensitized plate or film placed perpendicular to the optical axis. Generally, the lesser the area of the lens the better is the image received. The telephoto lens consists of two separate lens systems. The first enlarges the image and the second diminishes it in the normal manner of a camera lens. Accurate machine work has led to the development of the miniature camera, whose small lens area captures a scene as well as that of the large reflex. The making of lenses is a highly skilled work. It requires painstaking final polishing. The initial calculating of curves and refractive power involves months of intricate calculation.

Reflection (*Aks, partau*) is the casting back of light rays, sound waves or other radiant energy from surface. The angle of incidence (the angle at which the wave strikes the surface) and the angle of reflection (the angle at which it is turned back) are equal. In case there were no phenomenon of reflection it would not be possible to see objects not luminous in themselves.

Refraction (*Shua ka jhukao*) is the bending of light rays or heat or sound on passing obliquely from one medium into another of different density as, for example, from air into

water. It is on account of refraction of light rays by different thickness of glass (the wave-lengths of component colours being bent at different angles) that we see rainbow colours in a glass prism.

Mirage (*Suraab*) is an optical illusion by which objects are seen double or as if suspended in the air. Images of the distant objects and of the sky are seen reflected as if from a lake. On a summer midday, if you look far ahead on a coal-tar pucca road, you will see as if there is water on the road. But actually on going ahead you will find that there is no water. This phenomenon most frequently occurs in hot climates and more especially on the sandy deserts.

But contact with the hot sand the lower layer of air gets heated and therefore less dense. Consequently, up to the height of a few feet the density increases upwards. The least dense layers are then the lowest. Rays of light from a distant object traverse which are gradually less refracting, because the refractive index of air becomes smaller and smaller as the density increases. The rays continue their path. But they become more and more bent as they pass from one layer to the other. At last they fall on a layer at angle greater than the critical angle. The angle of incidence continually increases. Here total reflection occurs and the rays are bent upwards. In traversing the denser layers above, the rays get more and more bent. At last they reach the observer's eye, as if they came from a point as far below the reflecting layer as the object is above it. Thus, as inverted image of the objects like trees, as if they had been reflected from the surface of a lake of water, is observed.

Mirror (*Aaina*), a looking-glass, a reflecting surface, is an optical instrument consisting of a piece of suitable material having a surface polished so as to reflect light. A plain mirror has its reflecting surface as truly flat as possible, and produces a *virtual image*, the apparent position of which is as far behind the surface of the mirror as the object is in front. Since each point of the object is imaged at the point vertically opposite to it, the object, if it has no symmetry, is not seen as when viewed directly. Ordinary glass mirrors are made by depositing silver upon plate glass or window glass, by means of a solution of

silver nitrate and ammonia, to which a reducing agent has been added.

Microscope (*Khurdbeen*) is an instrument which magnifies to the eye objects so minute as to be almost or quite undiscernible without its aid. It is also known as *Magnifying Glass.*

Go high up on a tower or a mountain peak and look below on the earth. Things will appear to be very small. Or, observe things at a great distance, they will also, similarly, appear quite small, so much so that there shall be a stage when they will not be visible. Similarly, the streets and railway tracks appear to converge at a distance, although their width is the same everywhere. This means that the apparent size of an object is not equal to its real size. The apparent size depends upon the size of image formed on the retina (the innermost coating of the eye, consisting of a fine network of optic nerves) and consequently on the visual angle which the object subtends at the eye. This angle becomes greater as the object is brought nearer the eye, and decreases as it is taken away from the eye. The greater the angle under which an object is observed, the more magnified it appears or by making the visual angle larger, the body can be made to appear bigger.

One method of increasing the visual angle is to bring the object nearer the eye. But there is limit to it. We cannot decrease the distance below a certain limit (*i.e.*, the distance of distinct vision). Thereafter, the object is seen indistinctly. Now if a convex lens is interposed between the eye and the object in such a way that the object lies between the lens and its focus, a virtual magnified image will be produced at a greater distance from the eye. With the help of a single lens magnification up to 20 times are easily obtained. The second method is magnifying with the help of a *Compound Microscope*. Higher magnification of 300 to 1,000 times are obtained with its help. In principle a compound microscope is similar to an astronomical telescope. In both the cases the front lens form a real image of the object and the second lens is used to magnify the image produced by the first lens. The difference in their construction is due to the fact that the object glass of a microscope is used to view nearer objects

and as such should be of short focal length. The object to be magnified is placed just outside the focus of the lens. A real, inverted and magnified image of the object is formed. The eye-piece is placed at such a distance from the object glass that the image falls between the eye-piece and its principal focus. Consequently the eye-piece forms a virtual magnified image.

Ultra Microscope is a microscope of very high magnifying power and is largely used in the study of colloids.

Electron Microscope. In this microscope the source is illuminated by means of electrons which are focussed by the magnetic lenses *i.e.*, magnetic fields in contrast to the rays of light focussed by lenses in a microscope. By means of this microscope a magnification up to 10,000 times can be done. Still higher magnification can be obtained with proton microscope.

Telescope (*Doorbeen*). It is an optical instrument for viewing objects at a distance (*tele*, distance, *scope* that which one sees, space as far as one can see). It was first made by Galileo in 1609. In the telescope real image of a distant object is formed by a convex lens or a concave mirror and is examined by a magnifying lens. There are several kinds of telescope. As distinct from other types, an astronomical telescope has a finder fixed on it. It is used to find the discretion of any particular star. The finder has a large field of view. Therefore, the direction can be found more conveniently with it than with the bigger telescope. In order to enable an astronomical telescope to view the generally faint celestial objects the diameter of the object glass is made very large so as to catch as much of light from them as possible. With such a telescope a number of stars which are invisible to the naked eye become visible. Moreover, an object glass of a bigger diameter can be shown apart the stars which are very close to each other and which will appear as one, not only with the naked eye but even with a small telescope. In observing stars it does not matter whether the image is inverted or erect. But in observing terrestrial (earthly) objects it is very inconvenient if their images are inverted. Therefore, in all *Terrestrial Telescopes* a device for getting an erect image is employed. This is done in two ways, either by interposing a convex lens between the object

glass and the eye-piece suitably, or by using a concave lens as an eye-piece. The latter type of telescope is known of *Galileo's Telescope*. It is made up to two right-angled prisms, an object glass, an erecting lens, and an eye-piece. The two right-angled prisms reflect light and change its direction. The incident light falls through glass window near the top to the tube of one of the smaller faces of a right-angled prism and is reflected by it downwards, thus making it fall on the object glass. Thereafter, the light passes down through the erecting lens. On passing through it, the light falls on the second right-angled prism, where it suffers reflection and comes out in a direction parallel to the incident beam. Last of all, the light rays pass through the eye-piece. Then the rays reach the eye of observer enabling him to have a view of the outside surroundings. We can raise or lower the periscope tube at will. There is an arrangement to rotate the tube with the prism. This enables us to look in any direction we like.

Periscope is an apparatus which enables an observer to see over obstructions. Generally, it consists of reflecting mirrors so fixed in a tube that one set reflects the objects down the tube on to the second set, which passes the image on to the eye of the observer.

Periscopes were largely used in the two World Wars. They can be utilized from a concealed position. The trench periscope is made of two mirrors on the ends of a collapsible framework. It is also used in directing submarines. It enables the crew of a submarine to obtain a survey of the ships etc., on the surface of the sea even when the vessel itself is submerged in water. Submarine periscopes have special eye-pieces and additional lenses in the tube.

Peri in Persian mythology meant a being of beneficent nature with supernatural attributes. They were supposed to be descendants of fallen angels excluded from paradise to accomplish repentance.

Spectroscope is an optical instrument which, by means of glass prism, breaks up the light from a luminous body into bands of different colours. The observer is enabled to determine the constitution of a light-emitting body—as very luminous substance has its peculiar spectrum and provides the astronomer

with a means of judging what the stars are made of. The gas helium was detected by the spectroscope as existing in the sun before it was discovered on the earth.

Spectrum is the series of bands into which light or other radiant energy is resolved by passage through a prism, owing to rays of different frequencies being differently refracted or the bent.

Photographic camera. A photograph is a picture produced by the action of light on chemically prepared surfaces. Photography (Greek word meaning painting by light) is the use of light to record images on glass, paper or other substance. The first glimpse of such possibilities came in the sixteenth century with an Italian philosopher's discovery that a lens set in on one side of light-tight box would project an image of any external object with its range on a plate set in the opposite side of the box.

Camera is an instrument for throwing the image of an external object on a white surface placed within a dark chamber or box. The organ of sight of a photographic camera is made up of a combination of lenses, called the objective, which forms a real, inverted image of an object to be photographed. The objective is fitted to an adjustable diaphragm. Its outer sides are marked f/16, f/11.3, f/8, etc. The symbol "f" stands for focal length; f/16 or f/8 means that the diaphragm is one-sixteenth or one-eighth of the focal length. By changing the size of the diaphragm we both regulate the amount of light that falls on the photographic plate and improves the *definition* of the image.

Usually, the objective is mounted in front of a box, the interior of which is darkened. At the back of the box is a ground-glass screen. In order to enable the objective to move forwards and backwards (so as to increase or decrease between the objective or the screen) to get a sharp image of it on the ground-glass screen, the sides of the box are actually made of folded leather. When taking a photograph, the ground-glass is replaced by a plate sensitive to the action of light. The objective of the camera (*i.e.*, lenses) is then uncovered for a short time. It is again covered. The plate after being developed in a developing solution and fixed in a fixing solution shows an inverted image of the object, such that

whatever is dark in the object seems here transparent. We call it the negative. From the negative, the photographs are printed on a sensitive paper, which are called the prints or the positives. Whatever is dark in the negative becomes bright in the positive.

Moving pictures or Cinema pictures. The visual impression on the retina (*i.e.*, the innermost coating of the eye, consisting of a fine network of optic nerves) lasts for about 1/10 to 1/16th of a second after the stimulus, which produces it, has passed away. A series of photographs of moving objects taken upon a film (the coating on a plate prepared to act as a medium for taking a picture: a thin flexible membrane so prepared) are projected on a screen (a curtain) at the same rate at which they were taken. Due to the persistence of vision, the discontinuous pictures seem to blend into each other and thereby give the effect of *moving pictures*. Thus, what we see are no moving pictures. They are stationary pictures rapidly succeeding each other. Optical lantern consisting of a series of lenses throws on the screen a magnified images of photographs called *slides*.

Photographs for moving pictures are taken with the help of a special camera. Its shutter opens and closes automatically a number of times during a second. The film is moved past the lens with a jerky motion, so that it remains at rest during the time of exposure, but moves forward with a jerk while the shutter is closed. The pictures are generally taken at the rate of 16 per second. The size of each picture is 1 inch by $\frac{3}{4}$ inch. A reel of film is usually 1,000 feet long and contains 16,000 pictures.

Photochromy is the art of reproducing colours by photography.

Photo-engraving is a general term including all the various processes of mechanical engraving with the aid of photography.

Photology is the science of light.

Photometer is an instrument for measuring the intensity of light, especially for comparing the amount of light coming from different sources.

Photomicrography is the enlargement of microscopic objects by means of the microscope, and the projection of the enlarged on a sensitive film.

Photophone is an apparatus for transmitting articulate speech to a distance along with a beam of light.

Photosphere is the luminous envelope round the sun's globe, which is the source of light.

Phototype is a type or plate of the same nature as an engraved plate, produced from a photograph.

Sec. IV—Miscellaneous

Calculating Machines are the machines which perform mathematical operations such as addition, subtraction, multiplication or division of figures, etc. They are usually operated by key-boards like that of typewriters. They do much work in banks, formerly done with the help of pen and ink.

Chronograph is an apparatus for recording the time of occurrence of events. In its commonest form it records on a tape of paper moving at uniform speed by means of a motor, usually clockwork or electric. Lines are traced on the paper by pens. An electro-magnet is connected to each pen; when it receives a current, it slightly deflects the pen. Some instruments are so made that they can measure accurately to a thousand millionth of a second. For recording very short intervals of time a drum covered with paper is used, the marking devise being moved by means of screw thread as the drum rotates, so as to mark to spiral lines upon the drum. More rapid measurements require the use of photography, a drum revolving at a rapid rate and travelling at the same time, being covered with a sheet of sensitive paper.

Chronometer. A chronometer is a very accurate and well-made watch, and is used by captains of boats in helping to determine the longitude of the place where they are.

It is necessary for navigation that exact knowledge of the direction travelled in and of the position of the ship at any time should be known. The direction can be easily determined from the gyroscope. But it is not easy to determine the

position. For this purpose an instrument giving the correct time is necessary. The position of a ship is determined as follows. The chronometer or the clock is set to Greenwich time. It keeps the Greenwich time throughout the ship's journey. In order to find out the latitude of the ship the position of certain fixed stars in the heavens is observed and these positions are compared with those given in the Almanac. To determine the longitude, the time when the sun crosses the meridian, *i.e.*, reaches the highest point in its journey through the sky, is noted. From the difference between this and twelve o'clock the longitude can easily be calculated. In case the clock used does not keep correct time, the difference between the time when it is noon at Greenwich and the place where the ship is, cannot be known accurately. Therefore, a chronometer—a clock—keeping accurate time is an important instrument in the navigation of a ship.

Clock most accurate: "Eighth wonder of the world." A clock weighing four tons, having 12 main sections and more than 1,10,000 different parts, in the Copenhagen Town Hall, it is claimed, will gain only fourtenths of a second in 300 years. It is the lifework of a Danish locksmith, Jens Olsen, who died before it was completed.

The main dial of the "world's most accurate clock" shows the time on a 12-hour face as understood by laymen and known to navigators and astronomers as the local mean-time. Another dial shows sidereal time—the time as measured by the stars—by which a day and night is slightly shorter than a man-made 24-hour day. The hour in the solar time is given by a third dial. The most spectacular section of the clock, it is stated, comes into operation only at midnight on December 31. It takes a little more than five minutes to complete its function. The effect of this annual operation is conveyed to five dials and a rectangular calendar. Consequently, the days of the week and months against each fresh date for a whole year, the phases of the moon, the dates of the movable feasts and other facts relating to the movements of the moon and of the earth round the sun, are shown by the clock. Leap years are also taken into account. The clock also shows the local mean-time in nearly every part of the world. The time of sunrise and sunset of each day, the date of the month, the name

of the day, the name of the month and the years, the position of the main stars, the relative positions of the moon, sun and earth are indicated. The clock also shows eclipses of the sun.

Watch testing. On March 1, 1951, the Kew A test, for 67 years an international criterion of accuracy in watches, came to an end, when the National Physical Laboratory invented new system of watch testing.

Under the new system of watch testing it will no longer be necessary to look at a watch in order to test it. The error of the watch in relation to a standard quartz clock (a piece of pure rock crystal which vibrates 1,00,000 times per second), is determined to five-thousandth of a second. The photo-electric device will "see" the seconds-hands of the watch and communicate its readings to the quartz without human aid. "The tests will be 'so stringent that even the variations of day-to-dayatmosphericpressure willbetaken into account over the period of 38 days that the tests take." The new test is introduced by the National Physical Laboratory of England. Formerly only the Kew A test which was inaugurated at the Kew Observatory in 1894, was applied. Variation of five-hundredths of a second in 24 hours could be detected. There are two new tests: one for high-quality time-of-day watches sent by manufacturers, professional watch adjusters; the other to meet the requirements of time-keepers in sporting events.

Fire Extinguisher (chemical). Chemical type of fire extinguisher contains chemicals which on being mixed, produce carbon dioxide which extinguishes the fire better than ordinary water does. A commonly used fire extinguisher contains sulphuric and bicarbonate of soda in separate vessels. When required for use, the vessel containing the acid is broken, either by inverting the extinguisher when a weight drops on it or by striking when a piston breaks it. Large volumes of carbon dioxide are produced in the reaction and this comes out forcibly from the nozzle.

Gyroscope is a scientific apparatus illustrating the principle of a spinning top. The axis of gyroscope tends to retain its direction. It is applied to keep self-propelled

torpedoes on their course and to steady ships and help in steering.

Lightship is a vessel moored at sea with a light to mark some hazard to navigation. They are of various sizes and types ranging from a small vessel which can be left unattended for several months to the larger vessel equipped with a crew, radio telegraph apparatus, and signals to be used in time of heavy fog.

Lifeboat is a boat designed especially for saving lives in case of a wreck at sea. It is part of the equipment of all ocean-going vessels. Coast guard stations also maintain lifeboats. The first lifeboat was designed by Lionel Lukin in England in 1785. It contained the essential features embodied in the modern craft : exceptional buoyancy, achieved by means of air-tight compartments: stability; the ability to empty itself, and some means of navigation.

The deck of the boat is water-tight above the water-line. The water that comes over the sides runs out through openings provided to prevent water from entering. Many lifeboats have oars as the means of power, but a small motor of 40—50 horse-power is used in modern boats. Ocean liners and freighters have lifeboats with sufficient accommodation for passengers and crew.

Microtome is a device for cutting very thin and uniform. successive section of animal or vegetable tissues for microscopic examination.

Micrometer is an instrument for accurately measuring small spaces.

Micromilimeter is the millionth part of a milimeter.

Rainbow(*Qausqazah*) is a brilliant-coloured bow on circular arch seen when the sun shines in shower of rain or just after it. To see a rainbow, the observer's back must be turned towards the sun.

The formation of a rainbow is attributed to refraction, internal reflection and dispersion (the splitting up of a white light into its seven component colours—violet, indigo, blue, green, yellow, orange and red—given by one word *Vibgyor*, each constituent colour, having a different refrangibility.

When a ray of light from the sun meets a rain-drop, a part of it is reflected, whereas the remaining part of it is refracted. The refracted part bends towards the normal, gets dispersed and falls at the back of the drop and is internally reflected. When the various colours are deviated by refraction and internal reflection the result is that a semi-circular seven-colour effect is produced opposite the sun. This is called rainbow. The reflected part, when it meets the surface, is refracted a second time and comes out still more split up into component parts of white light. Often two rainbows are seen together. The inner rainbow is called the *primary rainbow*. It is formed by two refractions and one internal reflection. It is much brighter than the other and has red colour on the outside and violet on the inside. The second rainbow known as *secondary rainbow* is fainter and broader, being violet on the outside and red on the inside. It is caused by the rays which are twice reflected inside the drops.

Sky is the apparent vault (*gunbad*) of heaven. Where there are no clouds, the sky is blue owing to the sunlight being split up into its component colours by tiny dust particles in the air, and probably also by the air molecules themselves, the blue being reflected by the atmosphere. The larger particles of foreign matter reflect white light which dilutes the blue, the intensity of which increases towards the zenith and with altitude.

Soap: its cleansing action. Soap by itself does not clean anything. It is necessary that water should be used along with soap. When soap is dissolved in a large quantity of water, it undergoes hydrolysis (breaking down by water) and the extent of hydrolysis depends on several things, mainly on the amount of free alkali removed from solution. It takes place when the alkali reacts with the oil and grease that exists in the dirty clothes, etc. This is how the cleansing action of soap takes place. Other factors in the cleansing action are the emulsifying power, the property of penetrating oily fabrics and lubricating impurities, possessed by the hydrolysis products of soap.

Soft water is preferable to hard water (*i.e.*, water containing salts of calcium, magnesium, etc.) for the cleansing operation. The salts in hard water react with the fatty

acids produced by the hydrolysis of soap, and no lather (foam made with water and soap) is produced. Consequently, the soap becomes useless as a cleansing agent. On the other hand, soft water contains no such salts and with it soap at once raises lather.

Stethoscope is a form of microphone used by medical men for investigating the condition of the heart and lungs. It consists of a hollow tube, ending at one end in a flat tube. At the other end, it branches into two tubes which are inserted into ears.

Twilight (*Shafaq*). Daylight does not cease abruptly with sunset, but fades away gradually afterwards. This is due to the atmosphere. When the sun is only a little below the horizon, the upper layers of the atmosphere are still exposed to direct sunlight, which is there reflected and dispersed by the dust and water particles contained in the air. This diffused light reaches the earth and constitutes twilight. In the tropics where the sun descends almost perpendicularly to the horizon at sunset, twilight is naturally much shorter than in higher altitudes, where the sun's path is much more oblique. But for the atmosphere, sunset would be equivalent to putting out a lamp in a room at night; there would be neither dusk nor dawn.

Halcometer is an instrument for measuring small distances on the sky. It was invented by Bonque and improved by Dolland and Frauntrofer.

Solar cooker has been devised to cook food by using sun rays as the fuel. It consists of a reflector of appropriate shape and surface mounted on a suitable stand by which its angle can be adjusted. The reflector receives the solar rays and concentrates them directly on the utensil. Given strong sunshine, this cooker is capable of boiling a pound of water in about 10 minutes.

Sextant is an instrument used to measure the altitudes of the sun and stars or the heights of buildings, hills etc., by measuring the angles that two points at a distance bear at the observer's eye.

Milking machine is a mechanical apparatus invented by two Scotsmen, one dairyman, named Robert Kennedy,

and the other, an engineer, named Lawrence. Their machine, the Lawrence-Kennedy Milking Machine, bearing the names of both, has greatly facilitated the milking of cows. This invention was sharply followed in about 1907 by Messrs Wallace & Castle Douglas who adopted Lawrence-Kennedy principle but applied miniature pulsating mechanism to the base of each teat (*than*) cup.

Machine that understands spoken words. It was reported by the United Press of America (UPA)—a news agency—that on January 5, 1953, a man in New York spoke to a machine which listened, understood and obeyed. For the first time, therefore, man has come to have a machine capable of distinguishing the meanings of spoken words.

The machine, nicknamed 'Andrey', is reported to be just about the size of a small cabinet into which are rolled a combination of television and radio photograph. The machine that understands is the product of K. H. Davis, scientist, of Bell Telephone Laboratories, but apparently the machine is said to have an immunity to being ordered about by others.

Rain-making developments. The details of new method precipitating rain artificially by exploding small containers of gunpowders and silver iodide from high-flying balloons were given in "Nature" by Dr. D. A. Davies, of the East African Meteorological Department. "The new experiment consists of exploding small charges of gunpowder impregnated with silver iodide. These charges are carried into suitable clouds by hydrogen-filled balloons and fired by a time-fuse which is set to explode at a freezing level of 15,000 feet. Before the explosive charges are released, the speed of the upper winds is measured by the normal pilot balloon and theodolite method. Spectacular conclusions have been drawn from a few observations and without adequate control experiments. But many cases had been reported from some few observations and without adequate control experiments. Many cases had been reported of rain falling from clouds with water droplets. This was the recent development and the most efficient method was to spray small droplets into the base of a growing cloud, to provide through a process of coagulation.

the large droplets that were necessary to induce precipitation from shower clouds.

Reaping machine was invented by McCormik, an American, in 1831 for cutting down standing crop and binding them in sheaves ready for carting.

Thrashing machine is a machine for bearing out grain from the straw. It is driven by a horse, ox, wind or steam. The machine was invented by Michael Stirling in 1758. He was a farmer of Perth in Scotland.

Truth Serum is an apparatus claimed to have been perfected by Leonard Keeler, of the North-West University, Chicago. The apparatus renders it almost impossible for a criminal to tell lies when questions are put to him in a court of law. A criminal is inoculated by the Truth Serum before questions are put to him.

EXAMINATION QUESTIONS

WITH BRIEF SOLUTIONS

1. *Why precious stones, like diamonds, are bright?*

In the phenomenon of total internal reflection the whole of light is reflected back in the same medium and the separating surface appears to be very bright. The brightness of precious stones such as diamonds is on account of this fact.

2. *When a train or bus moves forward, why does the upper portion of the body of a person sitting in it gets a jerk in the backward direction?*

It is due to the inertia of rest. Inertia (French, Latin *iners-in:* not, *ars:* art) means that a body cannot move by itself or a moving matter cannot stop itself and needs an external force to change its state of rest or motion. The body of the person remains in its position of rest while the lower portion of the body in contact with the train gets sudden motion. An example of inertia of motion is that a person getting down from a moving train or bus has to run in the direction of the train or bus for a short distance in order to avoid a fall. In this case the lower portion of the body of the person comes to rest with ground while upper portion is still in motion.

3. *Why does man carrying a heavy load in the left hand bend his body over towards the right side and when the load is on his back, bend his body forward?*

A heavy load, when it is carried in the left hand, the centre of gravity of man and load is moved nearer to his other side. The vertical line through this point must not pass beyond the place where his left foot touches the ground. By bending his body he moves the centre of gravity to the right side. For this very reason, a load on the back compels a man to lean forward.

4. *Why does a ball roll?*

As the centre of gravity of ball is exactly in the centre,

the ball can readily take one position after another. If a ball be pushed, it will, therefore, continue to roll until the friction between the surface on which it rolls and the ball itself brings it to rest. A ball at rest is said to be in natural equilibrium.

5. *Why is a jet of water curved on coming out of a horizontal pipe?*

The gravitation force attracts the water downward. The resultant of the two forces, one horizontal and the other vertical, is the curved path.

6. *Two rubber balls, one filled with air and the other filled with lead, are dropped simultaneously from an upper window. Will they reach the ground at the same time? Give reasons.*

The two balls will reach the ground at the same time, because the gravity acts equally on both: provided that there is no atmospheric resistance. But actually the resistance of air is not negligible. The resistance of air is more in the case of the lighter of the two objects in size. Therefore, the ball filled with air would reach the ground a little later (a fraction of a second) than the ball filled with lead.

7. *Why is a table with three legs steadier than the one with four legs?*

In the former case all the three legs must touch the floor, whereas in the latter case, the four legs may not all touch the floor, because the four points do not necessarily lie in one plane.

8. *A cannon-ball was fired at by a body of soldiers. Those who were fortunate enough, heard the ball pass, saw the flash from the cannon, and heard the report. Specify the order in which they saw and heard them.*

(*a*) Flash, (*b*) sound of passing and (*c*) sound of the report. Light, a cannon-ball, and sound travel in this order.

9. *Why does an electric bulb make a sudden, loud noise when it is broken?*

An electric bulb has a partial vacuum. When it is broken, the air rushes in to fill the place and thus a loud noise is produced.

10. *Why is it that telegraph wires make a dull, low noise?*

The wind that blows against the wires sets them virbrating and produces a humming noise.

11. *Why does an empty bottle, open at the neck, when immersed in water, make a gurgling noise?*

Empty bottle contains air. When water enters the bottle, the air inside it comes out and makes a gurgling noise.

12. *Why does water or any other liquid make a gurgling noise when poured out of a bottle?*

A bottle has a small neck to allow a liquid out of it. As liquid flows out of the narrow passage, the air struggles to get in and fill the space and makes a gurgling noise.

13. *Why does the whistle of a locomotive sound a higher note as it approaches you and a lower note as it goes away? Or explain how the pitch of a train's whistle varies as the train approaches and goes away.*

Sound travels in the air at a constant velocity provided the temperature and pressure of the air do not vary. In case the whistle produces a definite (not variable) sound, it will consist of a definite number of vibrations per second. Therefore, in any second there will be that number of waves in a distance equal to that covered by sound in one second. But as the locomotive draws nearer the observer, the distance covered by the waves is reduced, or, in other words, the number of waves in a distance equal to that covered by sound in one second is increased. It means that a higher note is heard. Similarly, when the locomotive passes away, every sound wave is produced at a point comparatively farther away. The number of waves reaching the observer is, therefore, reduced and lower note is heard.

14. *Why does a tumbler frequently crack when hot water is poured?*

The heat causes a sudden expansion of the inner surface of the glass. Glass is a bad conductor of heat. It is not flexible. Its outer portion does not expand as much and as quickly as its inner portion. This difference of expansion causes the glass to crack.

15. *Why does a match light by striking?*

The head of the match is made of substances which require little heat to ignite them. The striking is simply friction and friction produces heat.

16. *Whyaremornings and evenings less warm than noons?*

Vertical rays are hotter than the slanting rays, because they have to travel less distance to reach us and thus lose less heat.

17. *Why are summers hotter than winters?*

In summer, rays of the sun fall more vertically than in winter and as such travel less distance and lose less heat. Besides, in summer the days are comparatively longer than nights and the surface of the earth gathers more heat during the day than it radiates during the night.

18. *Why is it that cloudy nights are usually warmer than clear ones?*

Clouds retard the free radiation of heat from the earth. They absorb and store up the heat radiated by the earth.

19. *Why is it that cloudy winter days are colder than clear days?*

Clouds do not allow the rays of the sun to fall on the earth. Thus the rays fail to convey their heat.

20. *What are the substances in coal which cause it to give heat when burning?*

Carbon and hydrogen give out a large amount of heat when they are burned. These two substances occur in coal, carbon being the chief constituent.

21. *Why does a piece of ice make a drink cold?*

Ice absorbs heat from the drink and melts. The heat is used up as energy. Thus the heat is absorbed from the liquid itself and it gets cold.

22. *Why do metal tea-pots, coffee-pots, etc., often have wooden handles?*

Metal is a good conductor of heat and metal handle would quickly become too hot to hold comfortably. Wood

is a bad heat conductor and remains cool even when the tea or coffee is very hot.

23. *Why should the outside of metal tea-pots be kept bright?*

In order to reduce to a minimum the loss of heat due to radiation, the outside of metal tea-pots is kept bright.

24. *Who was Fahrenheit and who was Centigrade?*

Fahrenheit was a German scientist (1686—1756). He improved the art of making thermometers and originated the scale known by his name. Centigrade is a word of Latin origin and means "hundred degrees". Centigrate was not a man.

25. *Why does marble appear colder to the touch than wood?*

Marble is a good heat conductor and rapidly draws the heat from the hand, while wood is a bad heat conductor.

26. *Why do we feel cool after perspiration?*

Water-drops of perspiration on our bodies evaporate into the air. The act of evaporation takes heat from our bodies and we feel rather cool.

27. *What is evaporation? Why does evaporation leave a liquid cool? Quote examples.*

Evaporation is the slow process of conversion of liquid into its vapour at all temperature. The liquid particles which get converted into vapour take away much heat content of the liquid thus leaving it cooler.

Water gets cool in an earthen pitcher much more than in a metal or glass container, because water gets evaporated through the pores of pitcher and in doing so absorbs some heat from remaining water making it cool. In a metal or glass container there are no pores and the process of evaporation is not possible. The water in an open pond is cool even on a burning hot day because during evaporation from the large surface area of the pond, a considerable amount of heat is taken away from water. When a perspiring man gets breeze, evaporation of the perspiration relieves him of some heat

contents of his body. Thus he feels cool. The air around him gets saturated with water, and vapour forming removes this air substituting it by unsaturated air.

28. *How does water in a glass cool when ice is placed on its surface?*

The layer of water surrounding the ice contracts by cooling, becomes heavier, and sinks down to the lower layer of water which is comparatively more warm and light. The process continues till the entire water in the glass attains a uniform temperature.

29. *Why do we use a mixture of a salt and ice in preparing ice-cream?*

Ice melts as it draws heat from the matter required to be turned into ice-cream. When mixed with salt, ice requires more heat to melt. Thus, a mixture of salt and ice absorbs more heat from the substance required to be turned into ice-cream and turns into a sort of ice.

30. *Why does a blacksmith heat an iron tyre in fitting it to a wooden wheel of a tonga having the same or less diameter?*

Heat expands the iron tyre. When expanded sufficiently, it is easily fitted over the wooden wheel. On cooling, the iron tyre contracts and grips the wooden wheel tightly.

31. *What do you understand by convection currents?*

If water in a pot is placed on fire, the water at the bottom gets hot and thus becoming ligher rises up. The cold water at the top being comparatively heavier, moves down. Continuous upward currents of hot water and downward currents of cold water thus take place. These downward and upward curren's are known as convection currents.

32. *Why do we use mercury in thermometers?*

Mercury is a good conductor of heat. It neither sticks to nor wets the thermometer. It is extremely susceptible to variation in temperature. As such, we generally use mercury in thermometers.

33. *Why should grass, flowers, leaves, plants have heavy dew?*

Grass, leaves, plants, flowers, radiate heat more quickly than many other things. Thus, at night, they become cooler than other objects. When moist air touches them it gets cooled and cannot hold the same amount of water as before. A part of the water vapour is condensed and deposited on these things in the form of water-drops.

34. *If you heat a metal pot containing water, you will find soon that the pot gets hotter than the water. Account for it.*

Water is a bad conductor of heat while metals are good conductors. The metal pot, therefore, gets hotter than the water inside.

35. *Why should ice be kept in a blanket?*

As blanket is a bad conductor of heat, it does not allow the outside heat to reach the ice easily. Consequently, the ice in a blanket does not melt away quickly.

36. *Why do we feel warm in woollen clothes?*

Wool is a bad conductor of heat. Woollen clothes do not allow the heat of our body to escape outside and we feel warm.

37. *Engine of a bus is surrounded by a tank in which fresh water is poured occasionally when the engine works. Explain the reason.*

The engine of a bus, when it works, generates heat and gets hot. The water in the surrounding tank absorbs much of the heat and gets heated and evaporates away. Fresh water is again poured in the tank. Thus, the engine does not get very hot.

38. *Why do clothes dry better on a windy day than on a calm day, the temperature being the same?*

On a calm day the air surrounding the clothes soon gets saturated with moisture which evaporates from the clothes, and consequently evaporation is checked. But on a windy day a fresh portion of air is being continually brought in contact with the clothes and consequently evaporation takes place more quickly.

39. *How does a ship float?*

A body floats in water when the weight of water displaced by a portion of it is equal to its own weight. As weight of the water displaced by the portion of the ship inside water is equal to the total weight of the ship, it floats.

40. *Why does a fountain throw its water up?*

When the surface of water-supply is at a higher level than that of the jet, it rises up in the form of a fountain, to keep its level.

41. *Why is one's breath 'visible' in cold but not in hot weather?*

In cold weather the water vapour contained in the exhaled breath condenses. It makes the breath visible.

42. *Why does oil thrown on a rough sea make it calmer?*

Oil, spread out on water, forms a thin film (a thin layer). This is so because oil has less surface tension than water. Moreover, the film of oil acts as stretched membrane and tends to suppress any movements in the surface of water. That is why oil makes a rough sea calmer.

43. *Why does a 'bad' egg float in water, whereas a 'good' one sinks?*

In a fresh egg the proportion of gas is small and the solid part is of greater specific gravity than water, hence it sinks. When the egg goes bad it decomposes, the proportion of gas increases and becomes sufficient to buoy up the egg, so it floats.

44. *How can you test the freshness of an egg?*

Put the egg in a tumbler of water in which a teaspoonful of salt has been dissolved. If the egg sinks, it is fresh; if it does not, it is not fresh.

45. *Why ice floats on water?*

Water expands when it freezes. Ice is frozen water. It expands in volume, becomes lighter and floats on the surface of the water.

46. *How does a cycle tube burst?*

When the air within a cycle tube has insufficient space to expand, it causes the tube to burst. It may happen when the tube is over-inflated or when in summer season the air within the tube expands on account of heat and requires more space.

47. *Why should a balloon filled with hydrogen burst high up in the air?*

Atmospheric pressure decreases as we go up. The volume of hydrogen in the balloon expands along with a decrease in the atmospheric pressure. It causes the balloon to expand to the last limit of elasticity. The balloon bursts at last.

48. *Why does smoke rise in the air?*

A body lighter than the air rises up in the atmosphere, for so long as it does not reach a layer of atmosphere equal to its density. Near the earth, smoke is lighter than the air and it goes up.

49. *A person who sleeps in winter in a room, with windows and doors shut, where fire glows, may die. How does it happen?*

A room with doors and windows shut gets an insufficient supply of air to take away carbon monoxide, a highly poisonous gas produced by the glowing fire. The poisonous gas may cause death of the sleeping person.

50. *Why is it that a parachute does not turn upside down in the air?*

There is a hole at the top of a parachute through which the air passes out slowly and keeps it upright. The weight of the falling person also helps it.

51. *State briefly how heat is transferred from one body to another.*

Heat is transferred from one body to another in three ways, *viz.*, by *conduction*, by *convection* and by *radiation.*

Where heat is transferred from one particle to the next without the movement of particles themselves, the transfer is by conduction. Glass is a bad conductor of

heat. If you pour boiling water in a glass container made of thick glass its inside surface tends to expand while outside surface is still cool, therefore the container cracks. If the glass were a good conductor of heat it would not have cracked.

Convection is that process of transfer of heat in which the particles get heated and move upwards so that other particles come over to get heated.

By radiation, the heat energy is transferred from one body to another though they are not in touch with each other. Similarly, we get heat from sun and by sitting at some distance from the fire. In summer, the temperature of the surroundings is sufficiently high and for comfort we need less quantity of heat. So we wear white clothes which being good reflectors and bad absorbers of sun's radiations, absorb a smaller quantity of heat and thus protect us from heat in contrast to dark clothes which absorb more heat.

52. *A kerosene lamp is put out by blowing, but a fire gets kindled. How do you account for it?*

Air contains oxygen which helps combustion. When air is blown, a strong fire gets more oxygen and kindles, whereas the flame of lamp which is comparatively weak gets severed from the burning gases and is extinguished by sudden blowing.

53. *Oxygen helps combustion. Water contains oxygen. But it extinguishes a burning fire. Why?*

Oxygen, in a free state only, helps combustion. Water contains oxygen combined with other gases, *e.g.*, hydrogen.

54. *What causes smoke to curl up into the air?*

The hot gases from a fire being lighter than air, move upwards. But on account of atmospheric resistance they rise up in curved eddy currents. The curved path is visible when smoke is present in the gases.

55. *How is air retained in a tube?*

Air is retained in a tube by means of a valve. When air is pumped in, the valve is forced open. The pressure

of the air within the tube automatically closes the valve after each stroke of the pump.

56. *What is the danger in leaving in the hot sun a wheel having tyre filled with air?*

If the tyres are inflated very hard there is danger of a burst owing to the expansion of the air in the tyre when heated by the sun. Should the tyre be wearing or should there be a weak spot in it, the danger is greater.

57. *How does a pen, say a fountain-pen, take ink from an inkpot?*

When rubber tube within a fountain-pen is pressed, the air within it is forced out and a vacuum is created. As soon as the pressure on the tube is eased after immersing in ink the lower part of the pen, the ink in the inkpot rushes into the tube to fill up the vacuum.

58. *Explain very briefly* (1) *why do water-pipes burst in very cold weather;* (2) *why does water cool more quickly in an earthen pot than in a glass vessel* ?

(1) In very cold weather, the water in water-pipes gets frozen. As the volume of water becomes greater when it freezes, the pipes burst.

(2) An earthen pot has pores through which water continuously comes out and evaporates. In evaporating, the water draws heat from within the pot. The water, thus, becomes cool. A glass vessel, on the other hand, has no pores, therefore no water evaporates from outside. Consequently, the water inside does not get cool so quickly.

59. *Trace the course taken by light from an observed object through a periscope into the eye.*

Light from the object enters through the upper lens (a piece of transparent substance with one or both sides, convex or concave) of the periscope into a right-angled prism. The light is reflected downwards. At the lower end it is again reflected through another right-angled prism and, coming out of the eye-piece, enters the eye of the observer.

60. *Explain in brief how a photograph is made?*

To take a photograph, the camera is adjusted until a

sharp image of the object is seen on the screen. Thereafter, the photographic plate is put in the place of the screen and exposed. This plate on being developed, *i.e.*, treated with certain chemicals, gives the 'negative'. From this 'negative', prints are taken on sensitised paper and are in turn developed, fixed and washed. These prints are known as photographs.

Photography is the art of taking pictures by the action of light on chemically prepared surfaces.

61. *Why are two eyes more valuable than one?*

With the help of two eyes we can view an object from two points at once and get an idea of the depth or solidity of a thing it viewed and do not see merely as a flat object.

62. *Why are mirrors in telescopes and other scientific instruments silvered on the front and not on the back?*

They are silvered on the front because if they are silvered on the back, faint reflection from the unsilvered front accompanies the main reflection. Further, only one surface needs to be accurately worked if silvering is on the front.

63. *Why do you run when you take a long jump?*

By running, the body gets into motion and the momentum so imparted is to keep it in motion when the body is in the air as during the long jump.

64. *Why is foam of the sea white?*

Foam is made up of so many little bubbles, each acting as a prism, and refracting the sun's rays into their primary colours. As there are so many prisms, the various rays are so interlaced and interwoven as to produce a white light.

65. *What colours go to form a rainbow?*

A rainbow contains red colour on the outer edge, followed by orange, yellow, green, blue, indigo and violet.

66. *Why does a railway engine appear to emit more steam in damp weather than in dry weather?*

In wet weather the air is already full of moisture and cannot absorb any more water, whereas in dry weather the condensed 'steam' turns into vapour and vanishes.

67. *What are the following and what for are they used?*

(1) *Pliers,* (2) *Level,* (3) *Lathe,* (4) *Thermometer, and* (5) *Diving Bell?*

(1) Pliers are small pincers or pinchers (instruments for gripping anything firmly, especially for drawing out nails (*sanny*) having jaws with parallel surfaces for bending wires, etc.

(2) A level is an instrument which gives the line parallel to the plane of the horizon and is used for testing whether or not things are horizontal.

(3) A lathe (*kharaad*) is a machine for shaping pieces of wood, metal, etc., by rotating them so that a cutting or grinding tool can be applied to the surface.

(4) A thermometer is an instrument with which we measure temperature.

(5) A Diving Bell is a large chamber made of steel plate which is open at the bottom. Inside a diving bell men can work underwater without using diving costume. "A large bell has the dimensions of a fair-sized room, and may weigh 30-35 tons."

68. *Butter, cheese and curd are made from milk. Contrast the essential chemical characteristics of these three substances; describe how they are actually produced from milk and give an account of the changes involved during production.*

Butter, cheese and curd are prepared from milk. Butter consists wholly of the fat contained in the milk, cheese contains the whole of the proteins and most of the fat in the milk. Curd (*dahi*) is produced by the action of microbes (bacterium found whenever organic matter is in process of decomposition) on milk, none of its parts being removed.

69. *What methods are employed for preserving food?*

Food can be preserved by cooking it with chemicals, *e.g.*, salt, by drying, by refrigeration or by pickling with vinegar, etc.

70. *What are the components of our atmosphere?*

Nitrogen, oxygen, carbon dioxide, water vapours are

the components of our atmosphere. Nitrogen is present in greater volume than other gases.

71. *What is elasticity? When is a substance called elastic ?*

Elasticity (coined from Greek *elastikos, eleunein,* future *elasein,* to drive) is power to recover from depression. It is the property by virtue of which body opposes external deforming force. A body subjected to external force undergoes deformation. External forces try to deform the body and internal forces try to restore it. A substance capable of regaining its original form is called *elastic*. The limit within which it is possible for a body to regain its original form is called elastic limit.

72. *Point out very briefly the differences in a heat engine, steam engine, locomotive engine, internal combustion engine and diesel engine.*

Heat engine. The machine that converts heat energy into mechanical energy is called heat engine.

Steam engine is the heat engine in which steam is utilised. In a steam engine, water is boiled in a confined space called boiler, producing steam at a high pressure which is made to push a piston, while expanding to come down to the atmospheric pressure.

Locomotive is an engine which is driven by steam or electricity, on a rail track.

Internal combustion engine is an engine in which combustion of fuel is carried out in the engine cylinder. Here again the expansion gas is utilised to make the piston move and thereby the wheel to move. In petrol engines a mixture of gasoline and air is used as the working substance. The portion or section of the engine which vaporises the liquid fuel and mixes it with air in correct proportion is called carburetter and the mixture passing through it is said to be carburetted.

Diesel engine is an internal combustion engine. In this, the gaseous fuel is mixed with air to form a combustible mixture. In this engine the fuel is ignited by the heat of compression. A full charge of air is always drawn and the

speed and power of the engine are generally controlled by measuring the amount of fuel that is supplied. Thus, it consumes less fuel and gives higher efficiency. Diesel engines are used for heavy road vehicles and for industrial purposes.

73. *What is a safety valve, steam turbine, hygrometer and air-conditioning?*

A valve, fitted to a pressure vessel, to allow steam to escape to the atmosphere, when the pressure exceeds the maximum, is called a safety valve.

Steam turbine is a turbine the action of which consists in blowing steam against blades fixed to a wheel and thus causing the wheels to rotate.

Hygrometer is the instrument for measuring the percentage of moisture in air or other gases.

Air-conditioning is the control of weather within four walls of a room or a building so as to make it comfortable. In complete air-conditioning many factors are controlled: temperature is kept around 65°F, relative humidity at 60—65%, air movement 25—75 ft., 25% fresh air is introduced, purification of air and deodorising are also maintained.

74. *What do you understand by centripetal and centrifugal forces?*

When a body, tied to the end of an inelastic string, is made to move in a circular path it experiences a force acting towards the centre of the path. This force is known as the *centripetal* force, and the force which comes into play, in accordance with Newton's third law of motion, due to reaction of this force is called the *centrifugal force*. It acts outwards from the centre of the circular path.

75. *State briefly how electric current produces heat.*

When a current flows for some time through an electric conductor, besides producing a magnetic field in the space surrounding the conductor, it also heats it. The amount of heat produced in the conductor depends upon its resistance, the current strength and duration of flow of current. The

greater these qualities, the larger is the heat produced. This is known as Joule's Law.

The fact that heat is produced when electric current passes through a conductor has been utilised for various heating and lighting purposes. An ordinary incandescent lamp consists of a fine wire of tungsten (known as filament, enclosed in a glass bulb either evacuated or filled with inert gases such as nitrogen, helium, neon, etc. When electric current flows through the filament enormous heat is produced on account of high resistance of the filament and the filament gets red hot which finally becomes bright white emitting white light.

The same effect is used in electric heaters and electric ions. The wire used in a heater is nichrome, an alloy of nickel and chromium. It has a high melting point. Therefore it does not melt at a high temperature.

76. *State briefly what you understand by (a) short circuiting and (b) safety fuse.*

Short circuiting is the situation created by the connection of terminals of a conveyor of electricity so as to create a path of negligible resistance for electricity. It is generally caused when two wires carrying current come in contact.

Safety fuse. It is the wire of a metal of slow melting point, which is connected in an electric circuit. When an excess current flows it melts, breaking the circuit. Thus, it saves the electrical apparatus from damage by excess of current.

77. *Why are alternating current (A.C.) and direct current (D.C.) so called?*

An alternating current (A.C.) is so called because the electric current *alternates in the direction of the flow*, whereas direct current (D.C.) is so called as it *always flows in the direction of the flow*.

78. *What are (a) aurora borealis, (b) aurora australis and (c) radio-activity?*

(*a* & *b*) Aurora borealis and aurora australis are extremely fascinating and attractive patterns of light seen in the sky in

the polar regions. It is held that electrified matter shot from the sun at very high speed, enters the varified atmosphere and ionizes the air molecules resulting in a glow of light. This resembles the glowing of discharge tubes. Earth's magnetic field is known to be responsible for directing the charged particles towards the polar regions.

(*c*) Certain elements, like thorium, radium, etc., emit continuously visible rays, like X-rays, etc. These radiations, although invisible, produce photographic effect, *i.e.*, they produce effect on a photographic plate when it is exposed to them. Such elements and compounds are said to be radio-active and the phenomenon is termed radio-activity.

79. *Of what is water composed?*

Oxygen and hydrogen in the proportion 1: 2. The chemical formula is H_2O.

80. *Why do bubbles suddenly appear in the water inside a siphon (jhuki hui nali) when some soda-water is taken from the vessel?*

Bubbles suddenly appear in the water inside a siphon when some of the soda-water is taken out, because the amount of carbon dioxide that will dissolve in water depends upon the pressure. When soda-water is allowed to get out, the pressure inside the vessel falls and some of the gas dissolved in the water must come out.

81. *Why does (i) a fountain throw its water up, (ii) a railway carriage in motion does not leave the rails, (iii) the oil rises up the wick (batti) of an oil lamp?*

(*i*) Water keeps its level. Water which spouts out of the fountain, rises as high as that in the reservoir.

(*ii*) A railway carriage in motion does not leave the rails because of the use of the inner flange (a projecting edge).

(*iii*) The wick is porous. The oil rises up through it.

82. *Explain briefly how direction of forward movement*

is controlled in (i) an aeroplane, (ii) a steamship, (iii) a motor-car, and (iv) a train.

The forward movement is respectively controlled by means of:—

(*i*) a tail which is controlled by necessary mechanism in pilot's chamber;

(*ii*) a rudder;

(*iii*) the steering wheel; and

(*iv*) a train runs on rails and no control is required.

83. *How was coal formed?*

It was formed from vegetation which grew upon the earth thousands of years ago. The soil was so fertile and the climate was so warm that ferns and plants grew to a much greater size than they do now. Earth movements resulted in the trees and undergrowth sinking below sea level. Great thickness of rock formed above and the pressure and lots of moisture and gases changed the vegetation to coal.

84. *What happens to iron when it rusts?*

It reacts with the oxygen of the air getting oxidised and forming oxides of iron which is the rust.

85. *Why are large ships fitted with double bottom?*

Should the outer one be damaged by coming into contact with rocks, sand-banks, or icebergs hidden from view, the inner floor will prevent the water from rushing into the ship. This may save it from sinking.

86. *Why is the hull of paramount importance?*

The hull (frame of ship) is of paramount importance because of its great influence upon the working of the ship, as a whole. It controls the depth at which the vessel will float, and its stability during a storm. The capacity for carrying both the forces required to drive a ship also depends on the shape and size of its hull.

87. *Is it possible to separate sugar mixed with fine sand?*

Shake up the mixture in a water tub. Sugar will get

dissolved in the water, and the sand will sink down. If you evaporate by boiling, from the sugared water, the sugar will remain behind.

88. *We cannot run as quickly on sand as on a hard ground. Explain the reason.*

Sand yields to the force applied by the legs in running, whereas a solid ground does not. The sand, therefore, does not react to throw the body forward as does a solid ground.

89. *Why is it not safe to get down from a moving vehicle?*

A person in a moving vehicle moves at a speed equal to that of the vehicle. When he gets down, his feet, on coming in contact with the stationary ground, lose motion. But the upper part of his body keeps moving on. This disturbs his equilibrium and he is thrown forward.

90. *What do you understand by the following:—*

(*i*) *Ampere*, (*ii*) *Ohm*, (*iii*) *Watt*, (*iv*) *Foot-pound*, (*v*) *Volt?*

They are units of measure as follows: (*i*) Unit of electric current. Ampere was the name of a physicist. (*ii*) Unit of electrical resistance, (*iii*) Unit of electric power. (*iv*) Quantity of energy that will raise 1 lb. to a height of one foot. It is a unit of work. (*v*) Unit of electro-motive force. It is the force that would carry one ampere of current against one ohm resistance.

91. *How can iron be protected against rusting?*

Iron is protected against rusting by painting iron all over. It may also be protected by a thin coating of tin or zinc.

92. *How does soap clean the skin?*

The foam of soap mixes with the dirt on the body and when washed with water, carries it away.

93. *Why do we feel tired in going upstairs or up-hill than in walking an equal distance on the level?*

In going up we not only walk an equal distance but also, at the same time, raise against the gravitation the weight of

our bodies to a height equal to the perpendicular height of the stairs.

94. *How should a fire be controlled in which petrol is involved?*

Water should on no account be used, as the blazing petrol floats on the top of it and the fire spreads. Sand is the best material to be thrown over it. If sand is not available, ordinary dust may be used.

95. *Why is a new blanket warmer than an old one?*

A new blanket holds more air and dry air is a bad conductor of heat.

96. *Why does hot tea cool more quickly in a saucer (a shallow plate) than it does in a cup?*

A saucer is flat and has a wider surface than that of a cup. Tea finds a greater surface to spread in a saucer than in a cup, and, consequently, it is exposed to a quicker evaporation. The greater the evaporation, the greater is the cooling.

97. *Account for the following facts:—*

(*i*) *Fire-fighters wear polished brass-hats.*

(*ii*) *It is easier to carry a weight inside water than outside it.*

(*iii*) *Drinking water can be obtained from sea-water.*

(*iv*) *A kerosene lamp burns in air but an electric lamp burns in vacuum-tight.*

(*i*) Radiated heat does not absorb on a polished surface, but it is reflected back. Thus, the polished hat protects a person while dealing with a fire.

(*ii*) A body in water loses its weight because of upward thrust of water. It is, therefore, easier to carry it inside the water.

(*iii*) On boiling sea-water, vapours may be made to pass through a tube and got cooled and condensed into drinking water.

(*iv*) In case of a kerosene lamp, combustion of kerosene oil, which requires oxygen from air, gives light. But in case of an electric bulb incandescence of the filament (and not the combustion of oil, as in case of lamp) gives light. In a vacuum-tight bulb there is no air left to damage the filament by oxidising it.

98. *What are the leading achievements of the following:—*

(*a*) *Darwin,* (*b*) *Edison,* (*c*) *Marconi,* (*d*) *Graham Bell,* (*e*) *Baird,* (*f*) *Bacquerrel?*

(*a*) He is known for theory of evolution.

(*b*) Invented electric bulbs and phonogram.

(*c*) Invented Beam system of wireless telegraphy.

(*d*) Experimented with electrical transmission of sound waves and invented telephone.

(*e*) Invented television.

(*f*) Discovered the Bacquerrel rays, the first indication of radio-activity.

99. *What is capillary action? Why oil rises through wick of an oil lamp?*

When a capillary tube is dipped in water it wets it. The pressure in water just below its meniscus is less than that above it. The atmospheric pressure acting on the surface of water being greater than this pressure, makes the water rise in the tube. This is known as *capillary action.*

The wick of an oil lamp has some air space between its fibres and may, therefore, be considered as a number of capillaries of very fine bores. When one end of the wick is immersed in the oil, it rises in it due to the capillary action.

100. *Write the answer to each of the following in one line:—*

(*a*) *Why do our hands become warm if we rub them together?*

(*b*) *Why do we not hear an electric bell ringing in vacuum?*

(*c*) *Why is an iron rim heated before it is fitted to a wheel?*

101. *What do you associate with the following:—*

(*a*) *Einstein,*

(*b*) *Harvey,*

(*c*) *Henry Ford?*

102. *Name the scientists who have become famous for the discovery of:—*

(*a*) *Laws of Gravitation,*

(*b*) *Theory of Relativity,*

(*c*) *Radium,*

(*d*) *Telephone,*

(*e*) *Theory of Evolution.*

103. *With what discoveries are the following names associated:*

(*a*) *Edison,* (*b*) *Farady,* (*c*) *Rontgen?*

104. *What are the uses of the following:—*

(*a*) *Chronometer,*

(*b*) *Anemometer,*

(*c*) *Fathometer,*

(*d*) *Mariner's Compass,*

(*e*) *Diving Bell?*

105. *What is a rainbow? How is it formed and observed?*

106. *State in two or three lines, the conclusion you would draw from each of the following sets of facts:—*

(*a*) *A piece of cork floats in water, whereas a piece of iron of equivalent volume sinks.*

(*b*) *Water boils at a lower temperature on the hills than in the plains.*

(*c*) *When rolling clouds collide, lightning and thunder are produced simultaneously, but we see the flash of lightning before we hear the clap of thunder.*

(*d*) *A stick which looks perfectly straight in open air looks crooked when partly immersed in water.*

107. *What is lightning conductor? What is its utility? Why are cloudy nights warmer than clear nights?*

108. *How is it that:—*

(*a*) *Electricians wear rubber gloves when they are at work?*

(*b*) *A small gap is left between two iron rails in a railway line?*

109. *Why does a tumbler of iced water collect moisture on the outside?*

110. *Answer the following:—*

(*a*) *Why do stars twinkle?*

(*b*) *Why does the same thermos keep things hot or cold?*

(*c*) *Why does water cool more quickly in an earthen pot than in a glass vessel?*

111. *Which is heavier: a pound of iron or a pound of cotton-wool?*

112. *Why in a country like Ladakh it is very hot in the sunshine but bitterly cold in the shade?*

113. *Why does a thermos flask keep a hot liquid hot and a cold liquid cold?*

114. *Describe the working of a refrigerating machine.*

115. *Why in a hot country like West Pakistan does electric fan cool more efficiently in May than it does in September?*

116. *What are the following used for:—*

(*a*) *Thermometer*, (*b*) *Barometer?*

117. *Why are mountains cooler than plains?*

118. *Explain the Principle of Archimedes. Does it apply to the movement of fishes? Explain as clearly as you can, how a fish can move towards the surface or the bottom of the sea.*

119. *What is buoyancy? Will it be the same for a brick and a wooden block of the same size pushed under the surface of water? Will it vary with the depth?*

120. *"A man is found to be lighter by 3 or 4 ounces when weighed in vacuum." Is it correct? If so, explain why.*

121. *Why is a chronometer so important an instrument in the navigation of a ship?*

122. *Why do things look small at a distance?*

123. *Why do railway tracks (two parallel railway lines) and streets appear to converge at a distance?*

124. *What is the cause of a rainbow and why does it take this shape and colour?*

125. *What are the elements of air?*

126. *What is a gyroscope? Give an instance of its use.*

127. *"The wheel is one of the greatest inventions made, without it the modern methods of travel on land would have been impossible." Discuss the statement.*

128. *Describe briefly the working of a chemical type of fire-extinguisher?*

129. *Why do we hear thunder after seeing the flash of lightning?*

130. *What do you mean by "Laws of Nature"?*

131. *How does a man of science arrive at a scientific truth?*

132. *Explain why a ladder is more apt to slip when you are high up on it than when you just begin to climb.*

133. *What is meant by Magnetic North?*

134. *Why does the needle of a Mariner's Compass point to the North?*

135. *How does a compass help indicating the direction?*

136. *Give an explanation of the origin of (a) water-spouts, (b) whirlpools, and (c) quick-sand in nature.*

137. *How do we measure depth of sea-water?*

138. *Soap is widely used for cleansing purposes; explain*

its action and give also the reasons why soft water is preferable to hard water for the cleansing operation.

139. *Trace the history of a rubber patch for a bicycle tyre from the plant to the manufactured article.*

140. *Write explanatory notes on the following:*

(*a*) *Electron microscope.*

(*b*) *Heavy water.*

141. *Explain :*

(*a*) *Why do we wear white clothes in summer?*

(*b*) *Why is water used in diet?*

(*c*) *Why is gas used in soda-water?*

(*d*) *Why is gas used in a refrigerator?*

142. *Distinguish between:—*

(*a*) *Oxidation and reduction ;*

(*b*) *Radiation and conduction ;*

(*c*) *Analysis and synthesis ;*

(*d*) *Mass and weight ;*

(*e*) *Concave and convex.*

143. *Account for the following (about three lines each):—*

(*a*) *It will be dangerous to allow extra passengers on the upper deck of a double-decker bus.*

(*b*) *A needle sinks in water; but an ironship floats on it.*

(*c*) *Mercury is the liquid used in thermometer.*

(*d*) *A red neck-tie appears black when seen under a blue mercury lamp.*

(*e*) *A dry cell is not actually dry.*

(*f*) *You can hear a noise in the next room even though the doors are tightly shut.*

144. *Mention one outstanding contribution of each of the following scientists:—*

(*a*) *Madame Curie,*

(*b*) *Davy,*

(*c*) *Edison,*

(*d*) *Einstein.*

145. *Write a short note of about 12 lines on the atomic structure.*

146. *Distinguish between the following:—*

(*a*) *Density and relative density ;*

(*b*) *A vapour and a gas ;*

(*c*) *Conduction and convection of heat ;*

(*d*) *Short sight and long sight ;*

(*e*) *Voltameter and ammeter.*

For answers to questions from 100 to 146, please consult the chapter.

CHAPTER 9

MAN'S CONQUEST OF AIR

To fly has always been one of man's greatest ambitions. He has been familiar with the idea of flying since ancient times. So many of the great mythical heroes were provided with wings or winged horses. Take up the romantic stories known as the "*Arabian Nights*" and you will find a mention of man's flying. There was an idea, at least, of flying even in those ancient days.

A historical survey. The Chinese claim that they were the first to fly. But it cannot be said with certainty as to where the first flight took place. The first record of ballooning (*ghubara men parwaz*) in Europe dates from the year 1709. A Brazilian, named Batolome Lorenzo di Guzamao, made trial of a balloon on August 8, 1709.

In 1766, Cavendish, a British chemist, showed to the scientific world that hydrogen gas was lighter than air. Etienne and Joseph Montgolfier, paper manufacturers of Annonay, in France, got the idea that if they could fill a paper bag with some cloud-like substance, it would rise. They made some huge paper bags under which they burned fires of chopped straw. To their great delight up went the bags. It was realized that it was not the smoke but the hot air with which the bags were filled that caused them to rise. The Montgolfiers took the lead in making balloons of different materials, silk covered with caoutchouc linen covered with paper. In 1783 they sent up a much bigger balloon in which were placed a sheep, a cock and a duck, in a car. It is said to have stayed in the air for eight minutes and come down quite steadily.

So far, no human being had trusted himself in the air. M. Pilatre de Rozier was probably the first pilot who was brave enough to trust himself aloft. He could not rise to more than a hundred feet. Later on, de Rozier along with a friend made the first free balloon ascension from

Paris, and drifting for 20 minutes at a height of 500 feet, came down safely in a field five miles away from the starting-point. Thereafter, the aeronauts began to make experiments in other advanced countries.

The first airship was simply a balloon elongated to make it directional, and carrying a small engine and air-screw to propel it. In 1852, Giffard made a small steam-engine and built it in a cigar-shaped balloon, but the power was insufficient. In 1884, Renard built an electrically driven, semi-rigid airship. Although very slow, it was rather successful. It had a small range owing to the heaviness of its power-plant. The first modern rigid airship was designed by Dr. Schowartz in 1897. The airship had an aluminium framework, and was covered with aluminium sheeting. Count Zeppelin was the great pioneer of rigid airship. In 1900, he built the first airship 400 feet long. It was fabric-covered. Since then great progress and improvements have been made in airships.

Scientific discoveries have had a deep subconscious association with our surroundings and close observation of commonplace objects. The idea of steam was gathered from water boiling in a kettle, steam inside the kettle lifted up the lid. From the earliest times nothing was more familiar to man than the flight of birds, and all his earlier efforts to fly were attempts to copy birds. The flying machine was made with flapping wings; we read of men making wings and trying to use them throughout the Middle Ages.

In 1809, Degen, an Englishman, constructed a machine with deeply concave wings which were covered with tafetta bands arranged like the feathers of a bird's wings. He is said to have arisen to a height of fifty-four feet. No further improvement could be made. This proved man's inability to fly by means of his own muscles.

Next came an ingenious flying machine invented by M. Trouve, a Frenchman. The flying machine was worked by a U-shaped Bourdon tube. The tendency of this tube was to flatten out, when subjected to sudden internal pressure. The pressure was obtained by firing cartridges into the tube. The machine—only a small model—did actually fly about 100 yards. The tube flattened out at each explosion and

worked a pair of wings which flapped like those of a bird.

The aeroplane was the first successful type of flying machine, because it imitated the most efficient birds of flight, and because it was simple to construct. The real pioneer of aeroplane flight was Clement Ader. As long as 1872 this inventor was busy with flapping machines. But he found them useless, and in 1890 with the aid of funds provided by the French Government, he built a real aeroplane. The machine was drawn through the air by two four-bladed screws driven by a steam-engine of about thirty horse-power. But Ader had not succeeded in getting a proper balance.

Professor S. P. Langley made his interesting experiments in America. He worked on these lines along which recent inventors have attained success. Langley built several flying machines which he endeavoured to launch from the top of a house-boat anchored in the Potamac River. His engines were driven by steam. After many failures, in 1896 he succeeded in flying for more than a quarter of a mile. The machine was of a considerable size, yet it did not run along the ground. It had to take off instantly from a height of a few feet above the water. Its speed was nearly twenty-five miles an hour. When steam gave out, the machine would settle quietly on the water.

Although Langley was on the right track, the people were indifferent and more often ridiculed him. In fact it is very often that the ignorant world ridicules the attempts of those who dare go on the right path. Some say he died of a broken heart. Langley could not realise that such a machine required a run to launch it. Later on, in May 1914, Glan Curtiss, a well-known American aviator, obtained Langley's machine out of the Museum where it was kept. He fitted it with wheels and made a successful flight.

Among the heavier-than-air machines, those developed earlier, were the gliders which did not contain any external driving engines. Several kinds of these were invented, some of which could easily keep flying, but they required a favourable wind. Their stability could not be depended on. The Wright Brothers—Wilbur (1867—1912) and Orvill Wright (1871—

1900)—the sons of an American clergyman, deserve a special mention. They believed more in practice than in theory and, choosing lonely place among the sand hills of the coast of North California, set to work to make their experiments in gliding (slipping smoothly and easily). They saw that the first problem of flight was how to control the machine in the air. The essence of the Wright-machines was that the pilot positively controlled his machines by his actions. The pilot's safety depended on his own skill; he really had to be a 'flying-man'. Though they met with several disasters and one of them lost his life in one of the attempts, yet they made flying possible. The ability to adapt iron and steel to a multitude of uses, the use of steam to power, the discovery of petroleum, the invention of the gasolene engine, the application of the electric current, all paved the way for the aeroplane which plays so large a part in the life of today.

By means of aeroplane man has created an entirely new geographical outlook. Long distances have been reduced, continental stretches have been compressed, ocean expanses have shrunk to the dimensions of straits, and islands dotting the ocean have become stepping-stones. The people of the earth have become a global community for good or evil. Jet planes with their high speeds promise to revolutionize communication and transportation by air. What the Air Age still holds in store, one cannot say.

Balloon (*ghubara*) means round or pear-shaped inflatable air-tight envelope, constructed to float in the air and carry weight when filled with heated air or light gas. The first instrument which enabled man to fly in the air was balloon. At first, air balloons used to be filled with hot air, but later on hydrogen came to be used. The hot-air balloons were liable to serious accidents. A free balloon not provided with any means of propulsion is at the mercy of the winds. There cannot be any sufficient control so far as direction is concerned.

Glide. Gliding is the art of flying an aeroplane by utilizing air-currents and the force of gravitation without any assistance from mechanical power. The configuration on the ground produces natural upward air-currents and by

alternately rising upon these, and gliding with the pull of gravitation, long distance can be covered in specially constructed light machines, known as gliders. A glider is, thus, a motorless aeroplane designed to fly by utilizing air-currents and having a body similar to but of simpler construction than that of a motor aeroplane. Gliders must usually be projected from a high place, such as a hill-top, in the first instance. In the early days of aviation, the gliding experiments contributed an invaluable knowledge.

Aerial navigation. Primarily, there are two questions involved in the problem of aerial navigation; firstly, the upward movement of the machine against the action of gravity, and, secondly, its propulsion through air. The questions of stability control, etc., are secondary questions.

Aerial Navigator. *Flight Log* is an instrument which keeps track of an aircraft's movements automatically and records them on a moving map. It is a development of the Dacca Navigator. It is a strip map which moves past a window in a small case. A stylus (writing implement) controlled by radio beams traces on the map the track made good by the aircaft so that the pilot can see at a glance not only where he is but also the track along which he has flown. The pilot gets the same information with the help of Dacca Navigator, but the information comes to him indirectly and he must transfer the readings on an instrument to a special chart. A way has been discovered for converting the meter readings into direct visual indications of position. Regular time intervals are indicated on the map so that it also tells about the speed.

Kite. Everybody knows kite-flying. *How is a kite balanced in the air?* A kite has a weight. We pull the string downwards. It is the upward pressure of the wind on the lower surface of the kite that keeps it up, even in the face of its weight and our pull on the string. The pressure of the wind is really a combination of two forces : (*a*) the *drift*, tending to move the kite in the direction of the wind and (*b*) the *lift* tending to raise the kite vertically up. Similarly, it is the upward thrust of wind that maintains the birds in the air.

Aeroplane. An aeroplane is a flying machine heavier

than air with fixed planes. It is maintained in the air by the pressure of the wind on its lower surface. The thrust can be resolved into two components, one tending to move the plane in the direction of the wind and the other tending to lift it vertically up. In order to lift the pressure and, therefore, the lift, relative speed of the wind should be increased and the greater the speed the greater the lift. In case the speed of the wind is not sufficient, the increased speed of the aeroplane will increase the relative speed of the wind. Normally, an aeroplane makes an angle of 3° to 6° with the horizon and is driven forward by propellers (revolving mechanism for driving machinery, ships, aircraft, etc.) which produce a wind. The effect is the same as if a strong wind were blowing against the plane and the plane were standing still. That is why the aeroplane is made to run along the ground before flying because it will rise early when a certain speed is reached.

To start the machine, the engine is started and two men rotate the propeller blades. As soon as the blades begin to move rapidly the men get aside and remove the obstacle placed before the wheels. The aeroplane then runs forward and as soon as the lift is sufficiently strong to overcome the pull of gravity on the machine, it begins to rise up. As soon as the aeroplane gathers a speed of some forty miles an hour, the lift on the plane is sufficiently strong to raise the machine high up in the air against the downward pull of gravity.

The propeller blades are generally made up of wood. They are two in number. The diameter usually varies from five to ten feet and the width is about one foot. The propellers are generally at the front. The blades are curved such that when they revolve, the air pressure pushes them from behind. There is a tail at the end of the aeroplane, made up of three parts. One vertical plane is in the middle and the other two wings just at right angles to the central vertical plane. Each of the horizontal wings is made up of two parts. One part remains fixed, but the angle of inclination of the other with the horizontal can be changed. In the beginning this second part is inclined a little below the horizontal. For rising up, this part is tilted up and for moving down it is tilted down. In case it is desired to move the aeroplane to the right, the central vertical plane is tilted to the right. In order to turn it to the

left the vertical plane is slanted to the left.

Various types of aeroplane. Various types of construction include: the *monoplane*, having a single pair of wings: the *biplane* or *multiplane*, having a number of wings, one above the other. The monoplane is more heavily constructed than the biplane. Its lifting power is comparatively greater, although its carrying power is less. Some very large modern monoplanes are built with wings thick enough to contain the engines. *Bi-* and *multiplanes* are more stable, structurally stronger for the same weight and require less wing span. Stability of an aeroplane depends a great deal upon the tail plane, which is used to oppose the pitching of the plane. The *seaplane* or *hydroplane* is designed to land on water and, therefore, has two or more pontoons, which are designed aero-dynamically and help to lift the wings. The *flying boat* differs from the seaplane in that its fusilage must be sea-worthy. The *autogiro* is a revolutionary design. It has a 'rotor' which takes the place of wings. The rotor is driven by power only in starting and landing, lifts or lowers the plane vertically: revolves by itself when the plane is underway. Experiments are being made in autogiro to achieve (1) direct vertical take-off, (2) a perfect means of directed control independent of motor power and forward speed, (3) a combination of autogiro and motor-car characteristics, resulting in either highway or air travel. The *helicopter* is an aeroplane that rises and is held up horizontal by propellers. The ancient dream of inventors has eventually come true.

Shock-absorber is an appliance fitted underneath an aeroplane for lessening the impact when the aeroplane descends to the ground after a flight.

Controlling an aeroplane in flight. By means of a control-lever (joy-stick) a pilot can steer his machine either up or down or from side to side, or maintain a lateral (pertaining to side) balance. Increasing the angle at which movable parts of the planes (*hamwar sat'hen*) meet, the air increases the pressure on them and forces the aeroplane upward.

Turning an aeroplane in the air. The main planes of an aeroplane have flaps (flap is anything broad and flexible that hangs loose) at the ends. They can be lowered or flattened. On making a turn, the pilot moves the lever which controls the

upright plane or rudder at the back of the machine in order to make the machine curved. The latter would overturn, were it not that flaps are lowered at the outside of the turn. This causes the outside of the plane to rise.

Banking is the practice of making a turn with the inner side of the aeroplane lower than the outer side.

Volplaning means gliding or coasting with the engine shut off.

Stability means steadiness in flight, whether vertical or horizontal.

Measuring the speed of an aerplane. This is done by means of a special mechanical device. On land we are able to judge our speed when travelling, by reference to other objects fixed or moving. But an airman has no such means at his disposal, because earthly objects are usually hidden from view by clouds. Further allowance must be made for the rate at which the air is moving; for example, if the air is moving at forty miles an hour an aeroplane travelling against it at sixty miles per hour only appears to be moving twenty miles per hour.

Zeppelin is an airship lighter than air designed by Count Zeppelin, a German.

Jet propulsion. Jet-propelled plane is a sensational and revolutionary development of aircraft. The plane has no propeller. It is driven by the force of discharge of expanded gases. Jet (*fawwara*) is a spouting steam: a spot at the end of a gas pipe emitting the flame. *Propel* is to drive forward, to urge onward by force. *Propulsion* is the act of propelling; a driving forward. *Jet Propulsion* is propulsion by means of the reaction of a jet of fluid (of air in the case of aircraft) expelled backwards from the machine.

The idea of jet-propelled aircraft, which was quite an old one, was taken up by Group Captain Frank Whittle who patented his plane in 1930. Eventually a company—Power Jets, Ltd.—was formed to exploit the invention. After four years' work the first jet engine ran successfully in 1937.

A jet-propulsion gas turbine engine consists of an air-compressor connected to a turbine by a central shaft, and a jet orifice. There are combustion chambers around

the shaft and between the compressor and the turbine. The air compressor draws air into combustion chambers. There it is mixed with paraffin and fired. The heat expands the air and generates gases. The gases burst out of the open rear ends of the combustion chamber and between the turbine blades. The turbine gets rotated and consequently drives the compressor. The aircraft is driven by the reaction from the jet of hot air and gases from the orifice (an opening) at the rear of the engine. The gas turbine engine can drive aircraft in two ways; firstly, by jet propulsion and secondly, by driving an air screw, either a normal type, or what is called a ducted fan.

The gas turbine engine begins where the normal piston engine, which has been used to power aeroplanes, leaves off. A piston engine has limits in creating power. There are grave difficulties in increasing its horse-power beyond 4,000. The weight and size of the higher-powered engines create fresh problem, in installing them in planes and cut down the loads they can carry. A new type of power plane was needed. It was found in the gas turbine engine which produces greater power and weighs far less. It is the jet propulsion gas-turbine which has set up the new speed record.

The last World War broke out in 1939 and much progress came to be made in the design of jet-propelled aircraft. The words "jet propulsion" came to have a deep association with the noisy and nerve-shattering German V-Is or doodle-bugs. These flying bombs were very much like small aircraft. Actually, they were pilotless aerial torpedoes with wings, jet propulsion, and a speed of 350 to 400 miles per hour. They carried a ton of explosive in the warheads and exploded on impact. Jet-propelled fighter planes were used in the later stages of the last World War to shoot down flying bombs.

Airport or Aerodrome is a landing field for aircraft. An airport usually provides hangars (sheds for aircraft), supply and repair-shops for the ships as well as an administration building and depots for passengers and cargo. Most often an airport is situated near a city or centre of distribution. It should have level, easily drained ground with few poles or obstructions near the field. It should be unaffected

by smoke or fog. An airport may be constructed near a water-front in order to accommodate seaplanes.

At least a half-mile runway is necessary for taking off, and a clear view of the field. Warning signal, beacons, boundary lights, obstacle lights, and wind indicators are maintained at night, and powerful landing lights flood the field for approaching planes. The control tower is the latest addition to an airport. In the control tower are co-ordinated various types of service: radio communication with all planes within the port area, directing take-offs and landings: receiving and sending radio weather reports; charting locations of planes after short intervals; directing lane or altitude changes when planes in flight approach one another too closely.

Airometer is an instrument for measuring the rate of flow of air.

Aircycle was invented by Enea Bossi of Philadelphia. It was an aeroplane or light glider propelled by manpower, by means of a pair of pedals geared to two propellers.

Law of the air. The increasing air traffic made it necessary to form laws of aerial navigation. They are somewhat as follows. A state or country has jurisdiction over its flying overlying air. Every aeroplane has one nationality and that is where it is registered. It cannot cross national borders except with a permit. Military planes may not cross national borders without a treaty. All airships must be licensed and inspected for air-worthiness. As in automobiles, driving pilots too must have licences.

Airways are routes in the air between traffic centres, over a territory suited to emergency landings. The air-routes are equipped with communication systems and other navigation aids. The sky-ways have become so crowded that careful airway planning and control has become necessary. Traffic control systems have been installed at some of the large air-ports. All planes equipped with radio submit their flight plans, which are used in the towers to keep up constant contact with the planes. Marker maps are used to record the positions of the planes in flight, the markers being removed after short intervals. Thus, the despatcher

in the tower can change the altitude or direction of a plane that appears to be approaching too closely to another plane. The roads of the air are superimposed one upon another by altitude direction from the towers. The weather reports are also conveyed to the pilots.

Aircraft in war. Devastating revolution in the strategy of warfare was clearly indicated by the performances of aircraft in World War II. Germany entered World War II with a great superiority of fighting planes of all types and also decided lead in the production facilities. Germany quickly won complete temporary domination of the air. Dive-bombers were sent in great fleets against the front lines of the enemy. They served the former purpose of artillery in softening the defence just prior to an attack. Gigantic transport planes were also used to drop troops by parachute into the rear of the enemy. Battleships were sunk from the air. The cities were demolished.

According to Major Alexander P. Seversky, a prominent air-war expert:

"(1) No land or sea operations are possible without first assuming control of the air above.

(2) The blockade of an enemy nation has become a function of air power.

(3) Only air power can defeat an air power.

(4) Land-based aviation is always superior to shipborne aviation.

(5) The striking radius of air power must equal the maximum dimensions of the theatre of war.

(6) In aerial warfare, quality is relatively more decisive than quantity.

(7) The principle of unity of command, long recognized on land and on sea, applies with no less force to the air."

Aircraft-carriers : Bombers : Fighters ; Rockets; Troop-carrying Planes ; Parachute ; Balloon-Barrage—*vide* the chapter on Military Terms.

Space Travel. Please see separate chapter No. 10 on the subject.

EXAMINATION QUESTIONS

WITH BRIEF SOLUTIONS

1. *What did supply the lifting power in the first balloon to ascend successfully with a man?*

It was hot air which iifted the first balloon. It was produced by a brazier suspended under the balloons. They were called fire balloons or Montgolfiers, after the inventor, Montgolfier.

2. *What is the difference, if any, between:—*

(*i*) *seaplane* (*ii*) *hydroplane*, (*iii*) *balloon*, (*iv*) *aeroplane*,

(*v*) *airship?*

(*i*) *A seaplane* is an aeroplane adapted for rising from and landing on water.

(*ii*) *A hydroplane* is a plane for lifting a boat above the surface of water.

(*iii*) *A balloon* is a sort of bag filled with gas lighter than air.

(*iv*) *An aeroplane* is a heavier-than-air flying machine. It is supported by the pressure of its planes on the air.

(*v*) *An airship* is a lighter-than-air navigable balloon usually cigar-shaped. It is propelled in the same way as an aeroplane and can be made to rise or fall by means of planes.

3. *What do you mean by an air-hostess?*

An *air-hostess* is a registered nurse, trained to provide comforts to the passengers while in the plane.

4. *How is an aeroplane, being heavier than air, able to travel in the air?*

This is mainly due to the propeller, consisting of two or four blades of wood or metal which are slightly twisted. The twists are all in the same direction. When the propeller revolves, the blades push the air behind. This makes the machine move forwards. This is exactly how we swim in water or how ships sail in the sea. At the start, the axis of the propeller points slightly upwards so that the machine is pulled

both upwards and forwards. The wings of the machine are made of light metal sheets so arranged that their front edge is slightly higher than the rear edge. When the machine moves, air strikes the lower surface of those wings and exerts a pressure proportionate to the speed. If the speed of the machine be sufficiently great, this upward pressure on the wings is enough to support the weight of the machine in the air. As the machine moves, a partial vacuum is created in the air above the wings and, consequently, an upward pull is caused. It is considerable if the machine goes at a high speed.

5. *Trace in an outline the history of man's conquest of the air and discuss its effects on civilization.*

6. *What is the difference between an aeroplane and an airship?*

7. *How is an aeroplane supported in the air?*

8. *Discuss briefly the main principles involved and the essential mechanism employed in a large, heavier-than-air flying machine that permits the machine to rise from the ground and to travel great distances in a controlled direction.*

9. *How is an aeroplane started preparatory to flight?*

10. *Why must an aeroplane run forward before flying upwards?*

11. *Why does a vulture run on ground before it can fly?*

12. *Explain the principle behind flight of an aircraft.*

13. *How do we learn the approach of distant aeroplanes?*

14. *How do we turn an aeroplane in the air without upsetting its balance?*

15. *Why is it difficult for an airman to estimate his speed when travelling, if he had no mechanical means of doing so?*

16. *Explain the principle of kite-flying. Can it be flown from running motor-car when there is no wind?*

17. *What is Flight Log or Aerial Navigator?*

N.B.—For answers to questions 5 to 17 please consult the chapter.

CHAPTER 10

SPACE FLIGHT

Man has been defying the elements since he appeared on the earth. Driven by the necessity of survival, by his love of adventure and by an insatiable curiosity where the unknown is concerned, he has braved the oceans, the mountains, the deserts, the skies, and finally space.

For several centuries man has lifted himself into the air with balloons but it was not until this, the 20th century, that Orville Wright, in 1903, made man's first powered flight. His average speed for this trip was 31 miles an hour.

Both the speed and the altitude of man's flights have increased since that time—slowly at first and then by great leaps. The speed of sound (about 735 miles an hour) was exceeded in 1947. The American X-15 has flown more than 4,100 miles an hour.

In space man has achieved altitudes measured in hundreds of miles and speeds measured in thousands of miles per hour. As far as the rigid requirements of space travel are concerned, man is not the most efficient mechanism. He requires an environment very closely resembling that in which he lives on the earth. In order to survive he needs adequate oxygen, barometric pressure, temperature control which no one has ever succeeded in building with a machine. He brings intelligence, judgment, determination, courage and creativity. He can use all of these attributes in case of the unforeseen. By simply adding man and his capabilities to a machine its chances of success in a space mission are enormously increased.

Possibilities of space travel have ardently seized the popular imagination. Articles and books which deal with space travel are written with enthusiasm. Nations are experimenting over space travel under guarded secrets.

Interesting facts. Out in space weight has no meaning, because weight, as we know it, is on account of gravitational

pull of the earth. A ship in space will travel at a colossal speed, covering millions of miles to Mars in a few weeks. Space is completely empty. There is not the slightest friction of any kind to the motion of the ship and there is no need of streamlining. The absence of friction makes it easy to drive the ship at great speeds.

Speed of Space Ship. There are difficulties in space travel. The outstanding difficulty is as to how we are to get the ship off the earth. The take-off consists of several steps; first a flight in a rocket ship from the earth's surface to the Space Station followed by transfer from the rocket to the station, and thence aboard a Space Ship, a rocket capable of reaching outer Space is required.

The development of the V-2 rocket during World War II showed that rocket flight was a possibility. Its extension since then has made it clear that man's dream of a flight to the moon is going to become a reality. Money and energy were spent under top secret by countries like Soviet Russia, the U.S.A. etc. The figure of 4,000,000,000 dollars spread over ten years was quoted as the cost of building the first Space Station. It was estimated that a Space Ship to behave exactly like a planet going round the sun would require astronomical speed something like 18½ miles a second, 1100 miles a minute or 66,000 miles an hour. This was the estimate of speed that was to be thought about. The jet plane's speed, 690 to 1000 miles an hour, amounted to a mere crawl in comparison! The earth or any other object in space behaves like a stone being whirled on the end of a string, the force of tension in the string preventing the stone from flying off at a tangent. Although in this simple case the stone moves in a circle, the same principle helps in space whatever the shape of the orbit in which the object moves. No driving power is required, the difficulty is of getting the right speed at the right place and at the right time. This may be achieved by firing a projectile from a gun, in which case the speed with which the shell leaves the muzzle, is the speed that matters.

In quite advanced experiments, a speed was acquired sufficient to force the rocket into an ellipse, which would meet the surface again after a few hundred miles. A greater velocity

was required to allow the rocket to travel farther. If it is great enough it would enable the rocket to circle right round the earth to return to its firing point. If the speed increases still more, the ellipse becomes big enough to reach the moon, but the rocket will still return to its starting point provided its motion is not disturbed in any way. In such orbits as this, the centre of attraction lies at the centre of the earth.

Path of travel. A space ship cannot travel in a straight line, whether it is driven or not. There are no straight lines in space. So far round-the-world orbits have attracted attention and of these the most important are the circular ones, in which a rocket would revolve for ever about the earth in a period which depends on the distance from the earth's centre. According to estimates, at 1,075 miles from the surface or 5,040 miles from the centre the time for one revolution would be just two hours, while for 22,000 miles above the surface, the period of revolution would be twenty-four hours. It was held that in order to enter such an orbit the rocket would have to be fired from a point in the orbit itself, or else, if fired in earth, would have to change the course when it reaches the proper height.

Experiments. Planning the creation of an artificial satellite of the earth—for this is just what a rocket of this type would become—was a point of great importance. Question of considerable consumption of fuel to throw the rocket to the required distance at the top of its flight arose. The rocket needed to be fired horizontally with exactly the right amount of power to give it the calculated velocity. Having reached the required distance, a short burst of power, it was held, would be required to give it sufficient extra speed to maintain it for ever in the satellite orbit. Later on, this idea was considered quite impracticable, because it entailed a far too long a journey through the earth's atmosphere. Moreover, for reasons of economy it was considered best to give to rocket a short sharp burst of power, giving it a high acceleration for a short period. It was considered suitable to think of a rocket firing for only a short period of a minute or so, rising vertically to a height many miles from the earth, and then turning over unto its proper orbit.

The behaviour of rockets was first exploited by the Germans. The impetus given by World War II brought this research to a tremendous climax the bombardment of south-eastern England by V-2 rockets. The V-2 weighing about 12 tons, it could carry a ton of instruments (or explosives) to a height of over a hundred miles, reaching speeds up to 3,500 miles an hour. The V-2 set the pace for future research. The U. S. Army and Navy technicians conducted experiments. Soviet Russia also did her best in this regard behind the Iron Curtain. Utmost secrecy was preserved. The Vicking No. 4, 45 feet long, 32 inches in diameter, weighing about 5 tons, reached a height of 105 miles in 1950. The Vicking No. 7 with modified dimensions and an improved performance reached a height of 135 miles. It reached a height of 30 miles in about 75 seconds and travelled at more than 4,000 miles an hour. On February 24, 1949 a U.S. Army W.A.C. Corporal rocket fitted to the note of a V-2 reached a height of 250 miles.

A lot of information of the upper atmosphere was gathered from time to time. Details were radioed back to earth continuously, transmissions being made on a large number of wave-lengths. It was, however, not possible to recover the complete set of instruments at the end of the flight.

A V-2 and the W.A.C. Corporal which reached a height of 250 miles was a two-stage rocket of the kind.

Thereafter, a three-stage rocket was planned to take a crew out to the two-hour orbit. The playload was planned to amount to 36 tons, rocket's weight 7,000 tons of which over 6,000 tons was to be accounted for by fuel alone. The plan envisaged that each stage as it used its fuel supply would become detached and parachuted back to earth to be used again in further flights. Engineers considered this scheme to be well within their capabilities.

Fuelling and refuelling. It was another problem to carry thousands of tons of present chemical fuel most of which would be expended in the difficult manoeuvres of rising through the earth's atmosphere and retarding the rocket on its return. A more efficient method of supplying the ship with fuel was

designed. The scheme was to refuel the rocket en-route by means of which instead of an attempt to lift 20,000-ton rocket from the earth in one stage, three rockets of 7,000 tons each would be utilised. The three rockets would go up to the satellite orbit, where one of them would be refuelled from the others and proceed on its way. Space stations are moving with incredible speeds in different directions in a mere imagined landing and refuelling purposes on the pattern of our present-day aircraft. As a matter of fact, our researches have been stinted to a great extent with our prevailing conceptions.

Navigating

Space ship is another great problem. To determine how fast and in what direction the navigator is travelling would not be an easy task. There is no possible way of reading them from a dial we know to-day. Radar methods will be of no avail beyond a distance from our earth. There will be no nearby and in relatively constant positions any objects to mark one's progress. On the earth observation will fix one's position on the earth's surface. But out in space, there is no gravity, no up or down, no plumb-line, no bubble. In space travel navigation, the methods that are useful on the earth will change. Other approaches to the problem will have to be tapped. Radar signals tell us our distance from the earth. The distance may also be known by just measurin the apparent angular diameters of the earth and the moon. The idea may be used for navigation in any part of the system. Thus in a space ship the sun instead of the earth can be used. The distance of the space ship can be determined by measuring the apparent diameter of the sun by photography. The longitude and latitude of the sun (and therefore of the ship) would be obtained by measuring the position of the sun among the stars on the plate of photography. The task of changing course will also present difficulties. A little error in direction will take the ship millions of miles away from its objective, because it will then move in a different curve altogether. Changing of direction in space is not a case of steering right or left, up or down. A space ship, like any other planetary body, behaves like a gyroscope, whose axis will never move in the direction in which it is pushed; but right forces in the right direction for the right space of time.

Crew in a Space Ship. It is a practical proposition to send an unmanned multi-stage rocket to circumnavigate the moon and return to the earth. The weakness of all these plans for space travel is the human element. How man will react to space conditions? We do not know much. Experiments were made on other animals. Photographs of mice formed part of the playload of a high altitude rocket. The mice "seemed to be quite happy"; it could not be ascertained how would it behave if it had been under the same conditions for days on end. The U.S. Department of Space Medicine in the U.S. Air Force School of Aviation Medicine studied reactions of the human body to the conditions of rapid acceleration that would exist in the first stages of rocket flight. It was found that seated in a rapidly whirling gondola, a volunteer is subjected to forces which range up to many times that of gravity, while his pulse, muscular reactions, rate of breathing and other factors are measured, and photographs taken during the experiments. It was shown that a subject who was in every way physically fit could endure forces several times that of gravity without ill-effects. At five times the acceleration of gravity, breathing becomes difficult and after a few seconds the subject loses consciousness if sitting upright. If lying down, it can endure these conditions still better. In a multi-stage rocket the accelerations will always be of rapidly increasing type, and will repeat as each stage drops away. The prospect for an ordinary person to indulge in space travel are thus considered rather remote.

Dangers. Every possible method is being used to explore the upper atmosphere. At a height of over 15 miles, the pilot of sky rocket had 98 per cent of earth's atmosphere beneath his feet. The high-altitude rockets can go right outside the atmosphere. The effects of shorter wave-lengths of sunlight (ultra-violet and X-ray) and cosmic rays are of the utmost importance and some form of protection will be necessary to safeguard the skin's exposure to sunlight. Plans have been made for the recovery of water, the disposal of waste, and the continual purification of air supply. But replenishment will always be necessary.

The presence of so many meteors in the outer space

(beyond the earth's atmosphere) is another danger in space travel. As there is no resistance to the meteors in the outer space, unlike their breaking up into dust, they continue to travel in paths around the sun. They can hit and destroy the space ship. There is no protection against them. These meteors thus become a formidable problem. It will be found interesting to note that we are protected on this earth, since the atmosphere shields us from the harmful effects of unwarranted meteors weighing many tons cosmic rays and the more dangerous of the sun's radiations: while we do not know at all how to deal with the perfect vacuum of space or with the unshielded light and heat of the sun. We have yet no idea whatsoever of the real dangers that abound in space.

Five objectives of space study. Dr. Newel listed the five objectives of the space studies which N.A.S.A. authorised to conduct for peaceful purposes. They are:

1. Where does the sun's atmosphere end, and is the earth and the rest of the solar system actually immersed in part of that atmosphere?

2. Where does the earth's atmosphere end?

3. Does the earth's magnetic field fall off gradually with distance, or is it modified by electrically charged particles in space?

4. Does the "Van Allen radiation bell", a zone of intense and unidentified radiation, detected by satellite Explorers I and II, extended out as far as the moon, or does it trail off as distance from the ea· h increases?

5. Unanswered questions about the moon and planets: Do they really have atmospheres? Is this atmosphere ionised (electrically charged)? Do they have magnetic and gravitational fields? How strong are they?

Data on orbits of Moon Rocket. To reach velocity 70×earth radius (280,000 miles), a rocket or satellite must have initial velocity of 23,900 m.p.h. (escape velocity from earth is 25,500 m.p.h.)

Moon and sun affect orbit when rocket is only 4,000 miles from the earth.

40,000 miles from moon, rocket accelerates because of lunar attraction.

2,000 miles from moon, lunar attraction can accelerate rocket to a velocity sufficient for it to escape from earth-moon system. Closer than 2,000 miles, rocket swings around moon and returns to earth.

Round trip—about 157 hours (6½ days).

Rocket moves slowest when farthest from earth, therefore it will be in vicinity of moon about ⅓ of total elapsed time. Possible orbits:

Rocket circles earth one or more times to reach maximum acceleration—23,900 m.p.h.

Rocket approaches moon, retro-jets slow it down.

Rocket orbits moon and may continue doing so for several weeks or months.

Rocket approaches moon, is accelerated because of gravitational attraction, reaches escape velocity and is thrown into an orbit around the sun.

Rocket approaches moon, is deflected from smooth ellipse by gravitational attraction, makes an erratic turn about the moon, and returns to earth-circling orbit.

Rocket approaches moon, is affected by gravitational attraction of moon and sun so that it moves in what would appear to an observer in outer space as a figure 8 orbit enclosing moon and earth.

The orbit of an earth-circling object has an apogee (greatest distance from the earth) and a perigee (shortest distance from the earth). The orbit of a moon-circling object an aposeleno (greatest distace from the moon) and a periseleno (shortest distance from the moon).

Purpose of future Moon-probes: To determine whether there is a magnetic field around the moon and to measure it if it exists.

To "see" the other side of the moon.

Purpose of initial Moon-Probes: To investigate the radiation layer first identified by the Explorer Satellites.

To gather information about tektites, natural glass globules of unknown origin which may originate on the moon.

To determine whether there are spores (encapsulated bacterial) on the moon.

Artificial satellites in space: Since World War II, Big Powers have feverishly been at work on atomic power, guided missiles etc. Soviet Russia and the U.S.A. have been in the race for launching artificial satellites in space. Russia has stolen a march over the world in this field. Sputnik I, Sputnik II, Sputnik III were successfully launched in space on October 4, 1957, November 3, 1957 and May 15, 1958 respectively. On January 2, 1959 Soviet Sun Rocket was launched. Moon Rocket was also successfully launched.

Launching a satellite. To fire a shell from a gun is a matter of common experience. The distance at which it falls to the ground varies with the speed and direction of the shot. It is the gravitational pull which brings it back. The launching of an earth satellite is somewhat like firing a gunshot, the size and force, of course, vary to a very great extent.

A rifle can give a range of few yards, real guns of a few miles. But ultimately the shell falls to the ground. But if there is a speed at which a shell or an object—an earth satellite—can be thrown forwards such that it never gets any closer to the ground, it would complete a circuit of the earth on account of the gravitational pull. The necessary speed is about five miles a second or 18,000 miles per hour. The higher up an earth satellite can be sent the greater the number of rounds it can make round the earth.

The effort required to launch a satellite depends on its weight, the height it is lifted above the ground, the air resistance during ascent and the speed needed to keep it in its orbit.

Estimates. With regard to the survival time of a satellite, time for one orbit and comparison of rockets are as follows:—

(a) Survival time of a satellite:

(after Ketechum)

Altitude (miles)	*Life of satellite*
78	15 minutes
93	22 hours
124	4 days
155	12 days
217	58 days
279	173 days
311	358 days
560	several years?

(b) Time for one orbit:—

Altitude (miles)	*Time for one orbit*
200	90 minutes
1,000	2 hours
22,000	1 day
2,35,000	1 lunar month

(c) Comparison of rockets:—

Rocket	*Stages*	*Altitude (miles)*
V2	1	130
Viking	1	160
V2—WAC	2	240
Corporal	3	300?
Vanguard Russian	3	560?

Re-entry means re-entry into the earth's atmosphere. All discussions of space travel depend on the solution of the problem of how a vehicle in orbit at speeds of thousands of miles an hour can get back to earth safely. This is the problem of losing speed near the ground and of getting through the earth's atmosphere without burning up.

The problem has been solved by both Russia and the U.S.A. Each has brought satellites out of orbit and retrieved them.

The solution of the first stage, the entry into the atmosphere at high speed, has been so far to have a fairly blunt-nosed vehicle with an outer skin that burns up. In the few minutes of travel such a burn-up of the outside can save the inside. The solution of the final stage so far has been the use of a parachute released at a certain height.

Problems of the re-entry of a vehicle large enough to hold a man have led to other possible solutions. One is to let the impact energy he largely dissipated in a shock-wave. Another is to shape the vehicle so that it goes like a glider into a very shallow dive. The speed is thus much reduced.

Why does a satellite stay in space? What prevents a satellite if it is ejected into space, from shooting into or reaching back to the earth? It so happens because the centrifugal force generated by the revolving motion of satellite exactly balances the pull of gravity. Centrifugal force pulls outwardly, the force of gravity pulls inwardly. These are two simple basic concepts of physics. To prove the mechanism of himself the reader may wrap a steel ball-bearing, or some other fairly heavy object in a handkerchief, tie a long string to its end and whirl the handkerchief overhead. On twirling the weight four stages of force will be evident. The first is the effort required to overcome the pull of gravity——the weighted handkerchief will have a tendency to drop to the ground rather than spin. A strong flip of the arm will be required to start it spinning. The second stage of force, after the weight begins to spin, will be its tendency to wobble downward——again the result of gravity——although it has gathered enough acceleration to move along a generally fixed path. The third stage is the point where its outward pull against the string will balance the restraining pull of the string as well as the downward pull of gravity. At this stage the load will appear to be to move freely by itself and will continue doing so if it is not resisted by the person holding the string. The fourth stage of force occurs if the string-holder gives added impetus to the centrifugal force generated by the weight, a rapid increase of wrist motion will cause the weighted handkerchief to strain outwardly.

These various stages of the string-and-weight experiment are comparable to (*i*) the rocket-borne take off an earth

satellite, (*ii*) slow acceleration to orbital speed, (*iii*) achievement of orbital speed, which provides exactly enough centrifugal force to balance the satellite against gravity, and (*iv*) the acceleration to what is known as "escape velocity"—the amount of speed required to break the grip of earth's gravity. (This would be approximately 25,000 miles an hour).

Another clear and simple analogy of how gravity and centrifugal force oppose or balance each other was made by Dr. S. Douglas Cornel, an American scientist. This gives the reader an insight into ballistics. "A mile away, the drop in the Earth's surface is eight inches—because the Earth is round," explained Dr. Cornell. "Therefore, if you shoot bullet fast enough so that it will drop eight inches in a mile, then it will never hit the earth. If it were to maintain exactly the same speed all the time, it would just keep going around and never drop to the ground. "The only trouble with a rifle projectile," he elaborated, "is that the air (resistance) slows it up. But if we could get it outside the air, it would not slow up. It would just keep on going. "Now if one fired a projectile faster than that," the Doctor continued, "then it would not follow the curvature of the earth. It would go off—out into the space. There is no critical speed."

The closer to earth an artificial moon is placed, the greater must be the speed needed to hold it in place. The weighted handkerchief and string can be used also to illustrate this phenomenon. Anyone who grips the string close to the weight will have to twirl faster to reach a state of equilibrium—the point at which the weight seems to be carrying itself around—than he will if he grabs the string at a position further down its length.

The reason for this is that the earth's gravity pull (symbolized by the string) diminishes with distance, so that less centrifugal force (the rate of whirl of the weight) is needed to equalize it at 100 miles than at five miles.

Why does a satellite not follow an exact circle? The gravitational forces due to the Sun and the Moon are negligible as earth satellites are so far off. The Sun and the Moon perturb the satellites only by about 3 feet. The gravitational forces due to the earth vary with the altitude because the earth is not a perfect sphere. The radius at the poles is some 12 miles

less than at the equator. A satellite travelling over different parts of the earth, therefore, experiences varying gravitational forces. The higher a satellite goes the less would be the gravitational pull to disturb its orbit. The earth satellite must eventually fall.

Telemetering, scientifically, means communication of measurement or transmission of measured data. Through radio waves measured data is transmitted by means of signals in the form of pulses. These waves are of different forms for communicating different informations. It is said that there are four basic variations of telemetering signal. They are as follows:

Pulse amplitude modulation. "In this method of telemetering, a signal of successive identical pulse is sent at a constant rate of repetition. The strength of the pulses, however, is modulated, that is varied in accordance with the quantity that is being measured. For example, if there is an instrument which can vary the pulse strength in accordance with the variations of, say temperature readings of a thermometer, we can transmit temperature data through these pulses. The variations in the strength of the pulses can always be converted back into temperature readings at the receiving end. Similarly, any other kind of data can also be transmitted through this mode of pulse variation."

Rate of pulses.

Pulse duration modulation. "In this method the strength and repetition rate of pulses is kept fixed while the duration for which each successive pulse lasts is varied in accordance with the measured data, which can be any of the quantities like temperature, pressure, density etc. This method is inherently less liable to be affected by atmospheric noise and ionospheric absorption.

Pulse code modulation. In this method each measured quantity is represented by a group of different pulses. The arrangement of these pulses within each group is varied in order to represent the variation of the measured quantity. An over-simplified example can be considered to be the ordinary telegraph Morse code in which the various com-

binations of dots and dashes represent the various alphabet.

Composite method. It is also possible to transmit data by means of combining all the above three methods of modulation simultaneously. In this manner it is possible to send several kinds of information simultaneously on the same signal. This is just like several persons riding simultaneously on a single horse. This kind of signal is no doubt very complicated but can be easily sorted out by means of special receiving instruments. It is quite likely that this is the type of signal which is used by Russian Sputnik 1. Sputnik No. 2 was reported to be sending information regarding the heartbeat, blood pressure and breathing of the dog.

"In fact there are also sub-variations of these methods; of modulations which enable scientists to send even a larger number of different kinds of data on the same signal simultaneously."

Reception record and analysis of data. Radio receivers receive the signal. Various informations are sorted out and passed on to various recorders. The record thus prepared is analysed carefully to determine conditions in outer space and the effects of cosmic particles and radiations on living organism. This information is so important in connection with interplanetary flights.

Radio control:

Command receiver. The fact that signals from the Sputnik were reported to stop and start on their own accord seemed to suggest that the transmitter of the satellite was being radio-controlled from the earth by means of a small radio receiver inside the satellite. This radio receiver could respond to signals from a transmitter situated on the earth and could switch the transmitter of the satellite "on" or "off" as the scientist below wished. In this manner, just like switching on car lights, the transmitter etc. could be switched on only when the satellite was in the most desirable position of the orbit instead of running down the batteries all the time.

Batteries. From the fact that radio signals of Satellite No. 1 lasted for a long time, it seemed unlikely that the commonly known batteries were used. It was suspected that some kind of solar device to replenish the charge of

the batteries continuously by means of energy derived from the sun was used.

Limits of space flight: Dr. Wernher von Braun, the German-born American rocket scientist, surveyed the current scene and the probable future development of manned space flight in an address he delivered to a meeting in Frankfurt on the occasion of 50th anniversary of the first International Aviation Exhibition held in September 1959. "No doubt, modern rocket technology has opened vistas surpassing even the most fanciful imaginations of a Jules Verne but the relatively short life-span of human beings will inexorably set certain limits to man's ventures into the universe—limits that man will not be able to overcome, even if he were to master all the technical problems of manned space flight.

Now that man appears to be on the brink of flying out into outer space, it may be as well that any exaggerated ambitions are checked by a few basic figures. Astronomers have made it a practice, long before anyone dreamed of space flight, to measure distances between the stars in "light years", *i.e.*, the number of years light takes to travel from one star to the other. The speed of light is the ultimate speed that is possible; light travels at the rate of about 186,600 miles per second, or the equivalent of seven and a half times around the earth's equator. According to Albert Einstein's theory of relativity matter cannot travel at a speed faster than that of light. Yet, the light from the constellation of Orion takes 500 years to reach the earth, and light travels no less than 100,000 years to cross the Milky-Way. These figures plainly show that man cannot hope to reach such distant stars or galaxies with his own life-span of 60, 70 or even 80 years.

In order to get a clear idea of what man may conceivably achieve in the field of space flight and what will be impossible, we have to keep in mind the structure of the universe. Most important to us is what might be called our "cosmic home", the solar system, of which the earth is a part. The centre of this system is the sun. Around its orbit the "inner four" planets: Mercury, Venus, Earth and Mars and the "outer five" planets: Jupiter, Saturn, Uranus, Neptune and Pluto. In addition, there are some 30 moons in our solar system, among them the earth's moon. Light travels the distance between moon and

earth in more time than one-and-a-quarter of a second. The sun's light reaches the earth in eight minutes, and light would require 10 hours to travel across the solar system from the outermost points along the orbit of the planet farthest from the sun.

But to reach the fixed star nearest to our solar system; the Alpha Centauri, the sun's light has to travel 4.2 years. The distances between the fixed stars—the sun is itself a fixed star—are incomparably greater than the distance between the planets of our solar system. The differences could best be demonstrated by a model; if the sun, which has a diameter of 1.4 million kilometers (875,000 miles), were to be reduced to the size of a pingpong ball, the earth would be no bigger than a pin-head. It would travel in an orbit at a distance of a meter (44 yards) from the "ping-pong ball" sun. The orbit of Pluto, the most remote of the sun's planets, would barely fit into a large football field. On this model scale the distance from the sun to Alpha Centauri would roughly correspond to the actual distance from Edinburgh to Paris.

The myriads of fixed stars are grouped in a system which resembles a disc or a flat lens. (Our solar system is not located in the centre of this disc, hence the apparently irregular course of the Milky-Way to human eyes). If we were to try to reproduce this disc on the above-mentioned model scale, the whole of the earth would not be large enough—the rims of the Milky-Way would extend to somewhere beyond the orbit of the moon.

Even this is only a tiny part of the universe. Far out in the ocean of space, there are countless further clusters of galaxies of the nature of our Milky-Way—galaxies which, in turn, consist of myriads of stars and stellar systems. The best-known system of this kind is the Andtomeda Nebula. Its light travels 1.8 million years to reach the earth. Powerful telescopes show the universe to be full of such galaxies (their name derives from "galaxies" the Greek word for the "Milky-Way"). With the aid of the world's largest telescope, on Mount Palomar, near Palo Alto, California, scientists have been able to count 400 galaxies in a section of the sky no larger than the full moon. Yet, even with the Mount Palomar telescope, scientists can only see stars at a limited distance. Sounds have been captured by giant radio-telescope which

are believed to emanate from stars and galaxies too far away to be seen through even the most powerful telescopes currently existing.

Three stages of space flight: For the problem of actual manned-space flight, we can disregard the artificial satellites orbiting the earth. They were merely a preliminary stage to real space flight, something like "cosmic coasting vessels." In principle, we have to differentiate between three distinct stages of space flight: "interplanetary" space flight to the moon or to other planets within our solar system; "interstellar" (deriving from the Latin word "stella"—star), space flight to fixed stars outside our solar system but still within the Milky-Way galaxy; and finally, "inter-galactic" space flight to far away galaxies outside the Milky-Way. In view of the distances mentioned earlier, man can at best hope to explore some of his "cosmic home," that is, our solar system. The universe beyond our solar system, particularly outside the Milky-Way, will remain for ever out of reach of earth launched astronauts.

Space satellites as war weapons: In future wars space satellites are going to play a great part as decisive weapons. That is why great nations are doing their utmost to gain supremacy in this field over one another.

Strategic warfare is fought on a global scale. In this war strategic targets of enemy are knocked out. Strategic targets, if knocked out, would thoroughly paralyze an enemy's war production facilities and weapon stockpiles, as well as destroy his will to resist. This would mean the planned destruction of his energy resources (oil fields and refineries, hydro-electric and nuclear power plants, gas compressor stations), his strategic industry (aircraft, missile, nuclear bomb and amunition factories, among others), his military training centres, launching pads and airfields, basic communications and transportation systems, test areas, steel mills and fabricating plants, shipping docks and submarine bases ——all in his homeland. A variety of weapons is required to destroy such a variety of targets. The U.S. Inter-Continental Ballistic Missiles, Atlas, Titan etc. are designed to destroy the heavy weight targets, Minuteman to destroy medium-weight targets and Titan II to destroy the extremely heavily fortified hardened targets. Global manned aircraft

Chart of Data for Calculating Interplanetary Flight.

	Mercury	Venus	Earth	Mars	Jupiter	Saturn	Uranus	Neptune	Pluto
Average distance from the sun (in millions of miles)	35.96	67.20	92.90	141.54	483.31	886.12	1782.70	2793.40	3,680
Diameter of planet at equator (in miles)	3,009	7,575	7,918	4,216	86,728	71,500	30,875	34,700	6,000
Mars or weight of planet (as compared to earth)	0.04	0.81	1.00	0.108	316.94	94.92	14.58	16.93	
Volume of planet (as compared to earth)	0.06	0.92	1.00	0.15	318.4	95.3	14.6	17.3	—
Number of planet moons	0	0	1	2	9	9	4	1	—
Period of planet's rotation (length of day in hours)	88	30	24	24.5	10	10.6	10.7	15.7	—
Period of orbital revolution (lengh of planet's year)	0.42	0.62	1.00	1.9	12	29	84	165	248
Orbital speed of planet (in miles per second)	29.7	21.7	18.5	15.0	8.1	6.0	4.2	3.4	—
Inclination of planet to orbit (in degrees)	0	—	23.5	24	3.2	26.8	98	29	—
Weight of object weighing 100 lbs on earth (in pounds)	25	85	100	36	264	117	92	112	—
Escape velocity required (in miles per second)	2.2	6.3	7.0	3.1	37.0	22.0	13.2	14.0	—

are also used to deliver nuclear and thermonuclear bombs, both the manned aircraft and missiles are vitally and concurrently required if an enemy is to be kept in place.

. There are also strategic satellites. Some of these are called "passive" types by the U.S. Air Force. SAMOS is one of these. Its purpose is to reconnoitre on a strategic scale. It can photograph armament buildups and strategic tragets in enemy homeland. A communications satellite can receive, store and re-transmit by microwave radio—— unhampered by weather conditions ——either voice, television, teletype or code messages. It cannot be jammed by an enemy. Soviet Russia claims that she can use her missiles, earth satellites etc. for very destructive purposes in case of war.

Space flights. The principal milestones leading up to space flights have been:

1650———Publication of *Artis Magnae Artilleriae* by Kazimierz Siemienowicz (Poland).

1689———Completion of *System of the World* by Sir Jsaac Newton (G. B.).

1783 Oct. 15 First balloon ascent by J. F. Pilatre de Rozier (France) (84 feet, tethered) Paris.

1797 Oct. 22 First parachute descent by A. J. Garnerin (France) (from 2,230 feet, balloon) Paris.

1805———Perfection of 6 lb. military rockets to 2,000 yard range by Sir William Congreve (G. B.).

1853———First man-carrying glider by Sir George Cayley (G. B.), near Brompton Hall, Yorkshire.

1874 (about) First powered hop by ramp-launched du Temple monoplane, near Brest, France.

1898———Enunciation of principles of rocket reaction propulsion by Konstantin Ziolkovsky (Russia G. Poland).

1903 Dec. 17 First controlled and sustained powered flight by Orville Wright (U.S.) near Kitty Hawk, N. Carolina.

1926 Mar. 26 First launch of liquid-fuelled rocket by Robert H. Goddard (U.S.) at Auburn, Mass.

1957 Oct. 4 First artificial satellite, *Sputnik I*, put into orbit by the Soviet Union.

1961 Apr. 12 First successful manned pace flight by Gagarin.

Astronaut	*Date*	*No. of Orbits*	*Duration hrs.*	*mis.*	*Spacecraft*
Fl. Major Yuriy Alexeyivich Gagarin, [illegible]	12 April, 1961	1	1	48	*Vostok I* (*U.S.S.R.*)
Major Gherman Stepanovich Titov, 26	6-7 August, 1961	17	25	18	*Vostok II* (*U.S.S.R.*)
Lt.-Col. John Herschel Glenn, 40	20 February, 1962	3	4	56	*Friendship* 7 (*U.S.*)
Lt. Cdr. Malcolm Scott Carpenter, 37	24 May, 1962	3	4	56	*Aurora* 7 (*U.S.*)
Major Andrian Grigoryevich Nikolayev, 32	11-15 August 1962	64	94	22	*Vostok III* (*U.S.S.R.*)
Col. Pavel Romanovich Popovich, 31	12-15 August 1962	48	70	57	*Vostok IV* (*U.S.S.R.*)
Cdr. Walter M. Schirra, 39	3 October, 1962	6	9	13	*Sigma* 7 (*U.S.*)
Major Leroy Gordon Cooper, 36	15-16 May, 1963	22	34	21	*Faith* 7 (*U.S.*)
Lt.-Col. Valeriy Fyodorovich Bykovsky, 28	14-19 June, 1963	81	119	6	*Vostok V* (*U.S.S.R.*)
Jnr. Lt. Valentina Vabdimir-ovna Tereshkova, 26	16-19 June, 1963	48	70	50	*Vostok VI* (*U.S.S.R.*)

CHAPTER 11

ROCKETS & GUIDED MISSILES

Rocket is the general term for a wide variety of jet-propelled missiles, research vehicles, thrust devices and fireworks. A rocket projectile contains its own propellant and depends for its flight on the reaction set up by a continuous jet of rapidly expanding gases released in the propellant by ignition (*e.g.* of crodite) or by the mixture of two liquids (*e.g.* alcohol and liquid air). Forward motion of a rocket results from reaction to a rearward high-speed flow of hot gases generated in the rocket motor. Either solid or liquid propellants are used to provide combustion gases.

Rocket motor or engine, is one of the family of jet-propulsion devices whose other members include turbojet, pulse-jet and ram-jet engines. The rocket engine is unique in that the elements of the propulsive jet, fuel and oxidizer are self-contained and are included within the vehicle. The thrust produced is independent of the atmosphere or medium through which the vehicle travels., Other kinds of jet-propulsion engines carry their fuel only. The oxygen content of the air, scooped into the engine as the vehicle flies along, burns it. These other varieties of jet engines are called air-breathing and are limited to operation within the blanket of atmosphere which surrounds the earth.

Uses. Rocket power is used for both, military and peaceful purposes—and has been used against targets thousands of miles away, or to life data-gathering instruments—and man—into interplanetary space for scientific research and exploration.

Historical view. The recorded history of rockets dates back to the 13th century. Interest in them has risen and fallen as various other devices, such as the mortar and artillery, became competitive. Since World War II rocket technology has attained a very high level. A rocket-powered ballistic missile can be fired against targets 6,000 miles or more

away. The speed at which it travels may be as high as 15,000 miles per hour. As the recognized power plant for space flight, the rocket is the key to exploitation of nature in a new dimension. As a matter of fact, the same basic vehicle used to carry an explosive warhead over inter-continental distances can be used instead to place man or thousands of pounds of scientific instruments in satellite orbit around the Earth. Launchings of Earth Satellites and of lunar and inter-planetary research probes are but the prelude to an era of space exploration. Until 1955 man was a passive observer of laws of celestial mechanics. Since then he has begun to apply these laws through the use of rocket power.

Classification of Rockets. There is no universally accepted systems of classification of rockets. However, every rocket and guided missile can be included in one of the following 9 categories:—

1. *Free-flight rockets* can be divided into two categories: (*i*) small barrage rockets and (*ii*) large ballistic rockets. In neither case the rocket is guided. It merely follows a ballistic trajectory like that of an artillery shell, the range being determined by the angle of elevation. Practically military rockets of either type have solid-propellant engines.

During World War II rocket developments were made at a very great pace by big powers. After World War II, the impetus of advanced rocket designs of free-flight rockets continued in the U.S. But the pace was much lower as compared with the one during the period of World War II. By 1950, the U.S. army had begun developments of Honest John rocket. It became operational in 1955. By and by it became very flexible and highly mobile weapon. It could be fired from a truck-mounted straight rail launcher or from a helicopter-portable launcher. The Honest John is 27 ft. long, about 30 inches in diameter, and weighs 4830 lbs. It has a range of more than 15 miles and can be equipped with either a high-explosive or nuclear warhead.

2. *Surface-to-surface missiles*. It was as early as 1907 that Rene Lorin of France designed an aerial torpedo. It was envisioned that the torpedo could be used as a means of bombing Berlin during World War I. One version of the

missile would have been powered by a pulse-jet engine. The 1100 lbs. missile was to have delivered a 440 lb. explosive playload at a speed of 300 miles per hour. The U.S. and Great Britain also explored the possibilities of radio-controlled unmanned aircraft for military purposes in the early decades of the 20th century.

First practical surface-to-surface guided missiles stemmed from two sources of activities in the 1920's and 1930's. These were the experiments of amateur rocket organizations and the theoretical work of such scholars and Engineers at Tsiolkovski, Goddard Oberth and Esnault-Pelterie. Valuable experimental works on both solid and liquid propellant engines during the 1930's. were located in England, the U. S. S. R., Germany and the United States. Germany designed V-2 (*vegeltungs-waffe Zwei i.e.*, "vengeance weapon two"). The V-2 rocket was nearly 47 ft. long, had a cylindrical diameter of 5.5 ft. and weighed about 27000 lbs. at take off. The one-ton warhead contained 1654 lbs. of high explosive. Propellants were liquid oxygen and seventy-five per cent. ethyl alcohol-water mixture. Approximately 8,400 lbs. of alcohol and 10,800 lbs. af oxygen were burned at a rate of 300 lbs. per second. The rocket motor produced 55,000 lbs. thrust for about one minute at which time the engine was shut off by an integrating gyro-system. Propellant supply was by turbo-pump, driven by high-strength hydro-peroxide decomposed by a catalyst. Yaw and pitch control was accomplished by two pairs of graphite carbon vanes in the rocket exhaust. Ignition of the alcohol-liquid oxygen propellants was effected by pyro-technic pin wheel inserted in the motor. Estimated maximum range was adout 200 miles. It was in September, 1944 that operational V-2 were fired by Germany on Paris and London.

The only other relatively long-rang, surface-to-surface guided missile to see action in World War II was the V-1 or "buzz-bomb" a development of German air force. The V-1 has been called, from an engineering point of view, "a perfect counterpart of the naval torpedo". The anology is striking in several ways. Once the V-1 was launched, its course could not be corrected, being guided by a present guidance system. An accelerometer sensed deviation to the left and right of the programmed flight path and sent corrective signals to

the control surface actuators. The missile's altitude was sensed and maintained in a similar manner by a barometer, and range was determined by a number of revolutions turned by a small propeller in the nose of the missile. When the requisite number of revolutions, corresponding to a linear range, had been made, a signal was sent to the aerodynamic control surface actuators to cause V-1 to dive vertically into the target. The average range of the weapon was 150 miles. Launching ramps and a hydrogen peroxide powered catapult boosted the V.I to flying speed.

The V-1 used a unique pulse-jet engine that formed later employment in early post-World War II Soviet and the U.S. missiles. Air enters a diffuser through a series of spring-loaded flapper volves that open as the air passes through them and then close when the air is in the combustion chamber. At this point in the firing cycle, kerosene from a gas-pressurised tank is sprayed into the chamber and ignited by a spark plug. As the chamber pressure of the burning gas rises, the flapper valves close and the exhaust gases are forced through the nozzle of the motor. The warhead of the V-I consisted of 2,200 lb. charge of high explosive set off by an impact fuze.

After German defeat in World War II Britain. France, Russia and the U.S.A. took German experts and utilized their services in this field. The priceless experience of the German rocket effort and the knowledge of about 150 rocket experts became available to the Allies.

In general, early post-war development of rockets followed most of the lines suggested by German work with two important additions: rockets for scientific study of upper atmosphere and to power supersonic reseach aircraft. Rockets were used to propel all varieties of guided missiles, competing successfully in these missions with air-breathing jet engines. Refinement of all components of these systems and improved technology based upon extensive research programmes have resulted in rocket-powered weapons of immense capabilities.

The post-war U.S.A. made much progress in the field of rockets. Until 1954 the long-range ballistic missile was not a major development. Until that time air-breathing subsonic missile developments such as Snark and Navaho were counted upon by military planners to supplement and

supersede long-range strategic bomber aircraft. These vehicles were essentially unmanned, turbject engine-powered, high-speed aircraft equipped with warheads. In 1954 two developments put the inter-continental ballastic missile (ICBM) in a new light. One of these developments was the thermonuclear bomb with destructive power measured in megatons (millions of pounds of TNT equivalent). The other was the miniaturization and refinement of internal guidance systems so that they became sufficiently accurate to place the warhead of the ICBM close to a target, 5,000 times more distant. The Atlas was a 1½ stage vehicle and the Titan was a conventional two-stage vehicle whereas a 2-stage vehicle drops both first-stage rocket engine and tankage, the 1½ stage vehicle drops only the rocket engine and the second stage continues to use the original tankage. A latter version of Titan used a higher-performance propellant combination of nitrogen tetroxide and hydrazine-based fuel. The use of nitrogen tetroxide eliminates the necessity of fueling the missile just prior to launching. In 1957 the U. S. Navy announced plans for a solid propellant missile to be known as Polaris. The Polaris entered operational service aboard nuclear-powered submarines in 1961.

3. *Surface-to-Air/Space Missiles.* In many ways the modern anti-aircraft guided missile system resembles the anti-aircraft gun system which consists of a gun director, a computer and gun mounts. The same basic elements are used in a typical aircraft missile system.' But it is much more complex. The target is tracked by optical or radar means to obtain data on its position with respect to the missile site. A computor then continuously predicts the future position of the target and sends the data to a second radar that guides the missile to the target by continuously altering its course to produce a collision. In actual practice a collision is seldom produced or desired, since the missile warhead is more effective if detonated at a certain distance from the target.

In order to combat Germany's Zeppelins in World War I British Royal Aircraft factory launched what amounted to the first surface-to-air guided missile. The weapon took the form of a pilotless aircraft with radio control as a gyroscope stabilizing system. The plane had a high-explosive warhead and was

powered by a 35 h.p. engine. The first modern surface-to-air missiles were developed when the limits of the anti-aircraft artillery to defend against high altitude, high performance airplanes were reached. The basic problem with an anti-aircraft shell fired from a cannon is that its velocity falls off with distance and its trajectory is fixed. Thus, a guided rocket that could maintain a high velocity and manoeuvre along its flight path was the ideal weapon to combat high-flying evasive airplane.

The development of surface-to-air space missiles began early in World War II. By the end of that conflict Germany had made impressive progress in the technology of guided anti-aircraft weapons. Typical of these early developments was the Enzian, a 4350 lb. rocket fired from a 20 ft. straight-rail launcher. To give the missile an initial high acceleration, four solid-propellant jats (jet assisted take off) units were separated from the missile by explosive bolts, and the liquid-propellant sustainer engine ignited, produced a thrust up to 4410 lbs. and giving the missle a velocity of 600 m.p.h. The missile was guided to the target by a radio command system, its path being altered by signals governed by an optical tracking system. After World War II Big Powers continued the development and refinement of anti-aircraft guided missiles. The U.S. Navy research programme initiated and developed a ram-jet engine suitable for use in a high-performance anti-aircraft missile. It resulted in production of the Talos, Terrier and Tartar missiles. The Lark and the Little Joe were also introduced. The former was a 14 ft. long, liquid propellant weapon with semi-active speed by two solid propellant jato units. It could deliver a 100 lb. warhead to a range of 38 miles. Later on the U. S. army concentrated on the Nike group of missiles. The first of these was the Nike-Ajax missile which was 21 ft. long, 12 inches in diameter and weighed 2455 lbs. With a range of 25 miles it has a liquid-propellant engine that gives it a velocity of 1,500 miles per hour. Nike B or Nike-Hercules, an advanced version of Ajex is 27 ft, long, 31.5 inches in diameter and weighs 5,000 lbs. It has a solid-propellant motor, can carry both nuclear and high-explosive warhead, has a range of 75 miles. The Nike-Hercules and Nike-Ajex both employ radar command guidance.

The early experience of the Nike programme gave the

U.S.A. first anti-missile, or surface-to-space missile. The Nike-Zeus is a complex and expensive defensive weapon designed to intercept incoming I.C.B.M. warheads and destroy them above the atmosphere. The missile itself is 48.3 ft. long and 45 inches in diameter. It weighs 10,000 lbs.

4. *Underwater Missiles* are the oldest form of guided missiles. In the past an underwater missile was known simply as a torpedo, but in every sense of the word it is a guided missile whether fired from an aircraft, a submarine or surface ship. An underwater missile contains the same subsystems as a surface-to-surface weapon: sensing, guidance and control, warhead and propulsion previously it could not command guidance or could not change course as its target manoeuvred. By 1963, however, these provisions were made. One major difference between the underwater missile and one that flies through the air is the fluid or medium in which it operates. Basically the problem of designing a missile from the hydro-dynamic viewpoint is the same as that of designing one from the aerodynamic viewpoint. The Germans developed a typical underwater missile Hs 294, a 4,800 lb. liquid-propellant rocket launched from aircraft against underwater targets. The missile impacted in the water at a 22° angle, shedding its engine and aerodynamic wings. The torpedo-like body with its 2,760 lbs. payload then travelled as far as 150 ft. to the target. An impact fuze detonated its high-explosive warhead.

Underwater missiles are employed in many ways: (1) underwater-to-underwater; (2) underwater-to-surface; (3) surface-to-water; (4) air-to-underwater; (5) underwater-to-air. Missiles can also be launched from under water and either fly through the air or travel along the surface and then re-enter the water to seek out a sub-merged target.

5. *Air/Space-to-Surface Missiles.* The air-to-surface weapons developed at the beginning of World War II. They were unguided, solid-propellant rockets. At first air-to-surface missiles were launched from open tubes suspended beneath the wings, but later experiments proved the efficiency and accuracy of straight-rail and zerolength launchers with mechanical fasteners to secure the rockets. Solid-propellant-powered, unguided bombs also developed with these rockets. The complexity and expense of such missiles is great. The guidance

problem is particularly difficult. It was found that at extreme ranges, programmed and command systems were not feasible and that it was necessary to rely on such delicate and exacting systems a stellar guidance, usually in combination with inertial guidance.

Japan developed two such weapons and used them during the war. They had a range of 3 miles. The Russians used 56 lbs. and 220 lbs. rocket-powered bombs. They were from Stormovik fighter and were particularly effective against tanks and other armoured vehicles. Germany and the U.S.A. used a variety of them. The German Hs 293 was a radio-guided bomb with a rocket engine using hydro peroxide as a propellant. By using aqueous potassium permanganate as a catalyst the chemical was decomposed into steam. A crew of three: a pilot, an observer and a bombardier was necessary to direct the Hs 293 to its target. The observer set the gyroscope that established a reference plane for the missile, and the bombardier piloted the bombs by remote control after its release from the aircraft. This type of missile especially adaptable to targets at sea and could strike many merchant-ship. The American Bat had a maximum range of 20 miles. In guidance it was superior to Hs 293, because it employed an active radar homing device. The Bat weighing 1,000 lbs., 12 feet long with a wing span of 10 ft. was a glide bomb, however, having no propulsion system. Developed primarily as a weapon for use against ships, the American Bat was to be released from an airplane at an altitude of 3 to 5 miles. The Bat's velocity was 300 miles per hour, as compared with 470 miles per hour of German Hs 293. A new air-to-surface weapon, the stand off bombs was developed after World War II. It represented a new concept in strategic bombing that developed when it became apparent that improved surface-to-air and air-to-air missiles with nuclear warheads limited the role of the long-range bomber. This concept envisioned the bomber as a launching platform and first stage for a very long-range guided missile with a nuclear warhead. The bomber was to carry the missile toward the target, release it, and return to its base well before reaching the outermost enemy's surface-to-air guided missiles. The range of these weapons varied between 100 and 1,000 miles. By 1963, the weapon assumed both political and strategic overtones.

6. *Air/Space-to-Air/Space Missiles*. This weapon was the last type of guided missile that developed operationally during World War II. Many types of air-to-air-rockets were developed by the various combatants. The Allies produced the unguided, fin or spin-stabilized solid-propellant type, whereas Germany developed several rockets that were technically far in advance of anything produced or planned by the Allies. The post-war period saw further U.S. and British developments in this type of weapons which made up their former deficiencies. They came to maintain a gyroscopically controlled stabilizer and guided to their targets by commands sent over an unreeling wire. Flares on the fins of the missile aided in tracking. A proximity fuze in the nose detonated the warhead at the optimum distance from the target. The post-war development centred on higher energy propellant, more efficient fuzing systems and powerful high-explosive warheads. By 1963, variety of homing systems for guidance had been introduced, such as infrared, passive radar, active radar, continuous-wave-radar, radar beam riders and combinations of infrared and radar had been introduced. Moreover, higher-energy solid-propellants and pre-packaged liguid-propulsion systems were proved feasible.

7. *Drones, Decoys and Test Vehicles*. Besides tactical and strategic missiles rocket propulsion is used for many types of military vehicles.

Drone. Drone is essentially a pilotless aircraft usually radio-controlled, and often employed as a target for anti-aircraft weapons. A drone is also used for potographic or television reconnaissance role. Simple and economical, the drone can be fitted with a camera, either photographic or television, and flown over targets at relatively slow speeds and low altitudes under operationally hazardous conditions. Its speed and altitude, in addition to its small size, cause a Drone to be difficult for anti-aircraft weapons to destroy, practically those weapons designed to combat supersonic airplanes and missiles. Many drones are equipped with small-bore turbojet or internal-combustion engines instead of having rocket motors.

After World War II, the drone was reduced to the role of aerial target and reconnaissance, the offensive missiles

and applications being taken over by the guided missiles and large free-flight rockets.

Decoys are designed to divert the defensive weapons of an enemy and to enhance the probability of success of a real missile. A relatively small decoy can be made to appear, by electromagnetic techniques, as large as a bomber or an ICBM on radar screens. It can limit infrared and other radiation to stimulate a re-entering nose cone or nuclear warhead.

Test Vehicles are a broad category of rockets and missiles designed purely to produce information and data on components or design features to be ultimately used in other missiles or rockets. Test vehicles are launched from the surface rather than from aircraft. Instead of a warhead they carry a payload of instruments to transmit data on flight performance to the ground or to recorders on board the vehicle that are recovered after the flight. Test vehicles are usually closely monitored by ground radar and optical instruments during flights. Test vehicles can often be designed simply and economically by using available and proven rocket or missile components, such as main stage and sustainer motors guidance and control systems, power supplies and telemetry instruments. Versatile vehicles are sometimes developed by com bining standard components into multi-stage vehicles.

8. *Atmospheric Sounding Rockets* have become important scientific implements although they are short-lived. They are the only means of lifting scientific instruments to heights between 50 and 100 miles above the reach of airplanes and balloons but still within the atmosphere and thus impractical to explore with exploratory investigations in geophysics and astronomy that can indicate whether or not more elaborate and expensive experiments would be worth while. Such rockets allow the dynamic testing of proto-type instruments for use in artificial satellites and space probes. Their size and simplicity, within limits, permit measurements to be made at times and locations desired by the scientist, such as meteorological measurements. On a weight basis, sounding rockets can lift a larger expendable power supply than artificial satellites for experiments of limited duration. Sounding rockets investigated such phenomena as cosmic rays' ultraviolet and X-rays, auroral particles, micrometeorites and the Earth's

magnetic field. Regions of intense turbulence and strong shear winds below the altitude of 60 miles and extremely high winds above this altitude were determined by means of sounding rockets in 1954. Temperature measurements at high altitudes are made by timing the arrival of the sound of exploding grenades ejected from sounding rockets such as Skylark and Nike-Cajun, at altitudes between 38 and 65 miles. Our knowledge of the temperature and pressure of the atmosphere, as well as the composition of the ionosphere was based on data from Sounding-rocket experiments. Sounding rockets range in size, performance and cost from the simple, single-stage solid-propellant rockets as 17.9 lb. Roksonde 100, which can lift a small meteorological playload to 5 miles to the two-stage, solid-propellant, 1,035 lbs. Aerobes 300, which can lift a 150 lbs. payload to 300 miles. Liquid-propellant sounding rockets are also used extensively.

9. *Space Carrier Vehicles* are rocket-powered vehicles used to launch spacecraft beyond the Earth's atmosphere. They were developed only after atmospheric surrounding rocket and ballistic missile technology had reached a high level of reliability, and after launching and handling techniques had been well proved. It was in 1959 that first small space carriers were fired from such sounding rockets as the Viking and such ballistic missiles as the Redstone. These rockets could handle rather heavy pay loads for low-altitude, moderate-range missiles at velocities of 4,000 to 5,000 miles per hour. With relatively small playloads these two carrier vehicles attained higher altitudes and much greater velocities: approximately 1,800 miles per hour. To provide the capability for their more difficult missions, the carriers required powered upper stages, which fired consecutively after the burnout of the next lower stage. Small space carrier vehicles were followed by larger ones. The latter were based on proved military ballistic missiles such as the Jupiter, Thor, Atlas, Titan. Virtually every advance in propulsion, guidance, control, telemetry, structural design, handling and launching has been made in response to original military requirements.

Various categories of space carriers are: (1) small carriers; (2) carriers based on intermediate range ballistic

missiles; (3) carriers based on intercontinental range ballistic missiles; (4) large carriers, and (5) air-launched carriers. The fifth category carriers are fired from balloons and airplanes.

Large Space Carrier Vehicles are propelled by liquid-propellant rocket engines, but many design studies have been made for-solid-propelled carriers and carriers with stages employing both liquid and solid engines. Nuclear and electric propulsion has also been examined for upper stages of advanced carriers.

The first known large-space carrier vehicles are the U.S. Saturn 1 and Saturn 1 B. Their first stages develop 1,500,000 lb. of thurst. Both carriers use the S-1 first stage, which is powered by eight liquid-propellant engines. Each engine develops 1,88,000 lbs. of thrust and is mounted at the left end of the carrier on a thrust frame. The tail section consists of a central barrel assembly of aluminium alloy box frames and corrugated skin panels, a fire wall and a heat shield, together with suitable shrouding. Eight attached outriggers transmit engine thrust and vehicle support loads. The stage is 10 ft. in length and 257 inches in diameter.

The advances from the Saturn 1 and Saturn 1-B carriers to the Saturn 5 are impressive. The former possess first stages developing 1,500,000 lbs. of thrust, compared with 7,500,000 lbs. of take off thrust generated by the giant Saturn 5. The first stage of the Saturn 5 known as he SIC, is powered by five liquid-propellant rocket engines, each developing 1,500,000 lbs. of thrust. This state is 38 ft. long and 396 inches in diameter. Its liquid oxygen tank is placed forward of the kerosene tank. Suction lines of the latter pass through tunnels of the former. Loaded the stage weighs approximately 4,400,000 lbs. and empty about 2,80,000 lbs. Four of the five engines are mounted on a 364-inches diameter ring with the pumps positioned inward. The remaining engine is mounted rigidly along the centre line. To control the vehicle, the outer four engines gimbal in response to guidance command. Mounted above the SIC is the S-2 stage, about 82 ft. long and 396 inches in diameter. Stage power is furnished by five engines, each developing 200,000 lbs. of thrust. As with the SIC stage, four of the engines are gimbal-mounted in a square pattern outside the rigidly mounted central engine.

The major mission of Saturn 5 is to launch Apollo spaceships from the surface of the Earth into orbit around the Moon, from where a manned landing can be effected. The carrier can place approximately 2,40,000 lbs. into an Earth orbit and 90,000 lb. to the vicinity of the Moon. The Saturn 5 was also designed to serve as the test vehicle for a nuclear-powered third stage called a Rift (Reactor in Flight Test).

Guidance and control. Most of the rockets require stabilization of some sort to minimize flight path deflection caused by wind, non-uniformity of rocket structure, rocket jet misalignment and other factors. In the case of long-range ballistic missiles or satellite launchers, it is necessary for the rockets to take off vertically programming a pitch deflection (tilt) at some predetermined altitude and velocity. The techniques used for flight control vary according to type of mission and accuracy requirements. Radio control or inertial guidance (stabilized platform) systems or both, initiate the correction and deflection signals to the vehicles.

In the case of some barrage-type rockets dispersion errors may be accepted because of overlapping explosive effect in the target area. Aircraft rockets are often stabilized by fixed fins located at the rear of the rocket. Folding fins which open by inertia, after firing are also used. A unique method of wire control, based upon the German air-to-air X-4 rocket has been used. This technique is utilized by some antitank rockets of about 1 mile range. Fine wire is trailed from pair of bobbins on the fins of the rocket and command signals are given by the operator observing its flight through a telescope.

If the rocket is designed to operate at high altitudes, as in the case of sounding rockets, satellite launchers and ballistic missiles of ranges greater than 100 miles aero-dynamic forces are no longer available for control because of the low density of the air. One technique is to place carbon or molybdenum deflection vanes within the rocket exhaust. Usually two pairs are employed for corrections about all three axes, one pair for pitch, the other for yaw and, in opposition, for roll. In flight deviations from flight path are sensed by gyros

within an automatic control (autopilot) system, and corrective signals are sent to servomotors which operate the vanes. This deflection system may be used also to programme the tilt from vertical launch to ballistic flight path. Radio command may also be used to initiate the tilt-programme. A modification of the jet vane method is the "jetevator", a ring-shaped deflector mounted at the nozzle periphery which rotates slightly into the edge of the rocket jet as required. Gimbal mounting of the engine, permitting the motor to swivel a few degrees in any direction is another method of flight path control. Injection of high-pressure gas in the rocket nozzle to create a local shock wave and differential pressure is a further technique of jet deflection. Magneto-hydro-dynamic (MHD) deflection of a rocket jet is another possible flight control concept. Since a rocket jet may be highly ionized it is conceivable that a magnetic field may induce deflection of the exhaust gases without physical contact.

CHAPTER 12

SPACE MISSILE TERMS

IBRM. Intermediate Rang Ballistic Missile which operates with Strategic Air Command.

Ablation. The melting of nose cone materials during re-entry into the earth's atmosphere at hypersonic speeds.

Aerodynamics is that field of dynamics which deals with the motion of bodies relative to the air and the forces that act upon them especially as related to flight.

Aerodynamic Missile, also "cruise missile." It is an aircraft-type vehicle designed for military purposes. Weight of this missile is sustained in flight through the use of wings or similar aerodynamic lifting surfaces.

Aeropause is a portion of the upper region of the atmosphere which does not have aerodynamic support for manned or unmanned flight.

Airfoil is any aerodynamic surface designed to obtain a reaction from the air through which it moves. An airborn wing, rudder or similar device is an airfoil.

Apogee is the highest point in orbit. It refers to the maximum distance away from the earth of an orbital vehicle. Perigee, point of nearest approach, is its opposite.

Askania is a cine-theodolite. It is a high precision optical instrument used in the ballistic instrumentation of guided missile test. Askania is the name of the German company which manufactures theodolites. The cinetheodolite is used in pairs of various combinations to survey the position of a missile in flight. The instrument consists of an accurate transit type surveying device. Automatically it records the azimuth and elevation angles together with a picture of the direction of pointing; thus tracking errors can be corrected and a true direction to the target determined.

Astronautics is the art or science of designing buildings, and operating space vehicles.

Atlas is an Air Force surface to surface I.C.B.M. (International Ballistic Missile) manufactured by the United States Astronautics Division of Convair.

Atmospheric braking is the action of atmospheric drag in decelerating a body that is approaching a planet. It can be deliberately used, where sufficient atmosphere exists, to lose much of the vehicle velocity before landing.

Attitude is the position of an aircraft or missile as determined by the inclination of its axis to some frame of reference. If not otherwise specified, this frame of reference is fixed to the earth.

Azusa is an electronic tracking system. It collects continuous precision data on the position of a missile flight. The system includes eight ground antennans formed in a cross, and a transponder carried in the missile. The transponder receives signals from the ground station and by "answering" them, reflects the initial raw data for use. In addition to it a data collection function, the AZUSA serves as the data source for the impact predictor.

Ballistic Missiles. A kind of missile, either guided or unguided. It is powered only for the brief, early portion of its flight and then travels most of its trajectory in a free-fall ellipse. If guided, a ballistic missile will ordinarily be controlled during the powered phase of flight only. It is capable of a change of direction by internal or external command during flight.

Ballistic trajectory. Trajectory is the curve described by a body under the action of a given force. The curved portion of a missile trajectory traced after the propulsive force is cut off and the body is acted upon only by gravity, aerodynamic drag and wind.

Block House. A reinforced concrete structure, located near the missile launching pad, which contains special control systems used by operating personnel to effect the remote control launching of a missile.

Booster rocket is an auxiliary rocket which provides additional thrust to assist the normal propulsive system of a missile or rocket in some phase of its trajectory or flight path. Two boosters are attached to the external surface of a SNARK to give added power on take-off. Shortly after the missile is airborne, they are dropped and it continues its flight on its own jet engine power. In another application, a booster may be considered the first stage propulsion system which powers the launch and initial trajectory phase of a multistage vehicle.

Celestial guidance is the guidance of a missile or vehicle by reference to celestial bodies. The missile is equipped with gyroscopes, telescopes, mechanically or electrically recorded navigational tables, computers, and other instruments and devices that sight stars, calculate position, and direct the missile.

Condensation trail (Contrail) is a visible cloud like streak which trails behind a missile or vehicle in flight under certain conditions. Usually it is white in colour. Condensation trail is caused by the formation of water droplets or sometimes icy crystals due to the sudden compression; then by expansive cooling of air through which the vehicle passes. Contrails are sometimes called *vapour trails*.

Cotar is an electronic tracking system using omni-directional antennas and a transponder in the missile to measure positions of a missile in flight. The word COTAR is abbreviation for CO relation Tracking and Ranging.

Countdown is the numbered and tinned sequence of events and checks that must be conducted during the last few hours (normally six to eight) before a test missile is launched. Countless switches and valves are checked, missile subsystems are warmed up and started, the readiness of launch facilities and range stations are checked, propellants are loaded abroad the missile and other such items are done in the cutdown time.

Crew is a group of specialists who perform simultaneous and sequential duties and tasks involved in an assigned operation.

Destruct is the deliberate action of detonation or otherwise destroying by an explosive or other device a rocket,

missile or vehicle after it has been launched but before it completes its course. The deliberate action of destruction is taken when the missile gets off its plotted course or functions in a way to become a hazard.

Destruct line is a graphic representation drawn on a geographical map to show the boundary which a missile must not cross during flight. These lines are all super-imposed on maps and define the space corridor in which missile may fly. A missile which moves beyond the destruct line one either side is destroyed.

Destructor is an explosive or other device by which a missile or rocket or a component thereof is intentionally destroyed.

Doppler effect is the apparent change in frequency of a sound or radio wave reaching an observer or a radio receiver. The change is caused by a change in distance between the source and the observer or the receiver during the interval of reception.

Dovap is a system which consists of a ground transmitter station and a series of ground receiving stations which operate in conjunction with a transponder in the missile. By means of this system information is obtained on the position and velocity of the missile. The doppler effect system mentioned above is employed. The word DOVAP is drawn from the abbreviation for "Doppler Velocity and Positions."

Drone is a remotely controlled pilotless aircraft.

Escape velocity is the minimum velocity required for a rocket, missile, or other object to escape the gravitational attraction of a planet or other special body. The velocity is given b: the equation $V=\sqrt{2gR}$ where R=distance from centre of earth; g=acceleration one to gravity at that distance. The earth'- velocity is nearly seven miles per second, nearly twenty-five housand miles per hour. The moon's escape velocity is about $1\frac{1}{2}$ miles per second or 5400 miles per hour.

Explorer was the first U.S. earth satellite which was successfully placed in orbit on January 31, 1958. A modified Jupiter C rocket consisting of four stages was used as the

launching vehicle.

FBM is the abbreviation for Fleet Ballistic Missile.

Flight test is the test of an aircraft or missile by actual flight or launch. It is planned to achieve specific test objectives and gain operational information on the vehicle.

Gantry is a crane-type structure with platforms on different levels, used to erect, assemble and service large rockets or missiles. It is placed on the launching site and rolled away before firing.

Ground start is a propulsion starting sequence through ignition to main stage which is initiated and cycled through to completion on the ground. In large rocket vehicles this ground start is commonly effected from pressurized propellant tanks external to the missile, permitting the vehicle to take off with its internal propellant load intact.

Guidance. It is the process of intelligent manoeuvring which causes a missile or other vehicle to reach a specified destination. The term includes the entire scheme *i.e.*—sensing devices, computers and the servo systems necessary to convert the calculated guidance commands in vehicle response. Guidance is achieved by control in two phases *viz. altitude control* and *path control.* Guidance may be divided into phases of the flight path as: *initial, mid-course,* and *terminal. Guidance midcourse* is the guidance applied to a missile between the termination of the launching phase and the start of the terminal phase of guidance. *Guidance Terminal* is the guidance applied to a missile between the termination of the midcourse guidance and impact.

Basic Guidance Systems. There are eight essential basic guidance systems: preset, terrestrial reference, radio navigation, automatic celestial navigation, inertial command, beam rider, and homing.

Guidance Preset is a system of missile control wherein a predetermined path is set into the control mechanism of the vehicle and cannot be adjusted after launching.

Guidance Terrestrial Refence is a technique of missile

control wherein the predetermined path set into the control system of a missile can be followed by a device in the missile which reacts to some property of the earth, such as magnetic or gravitational effects.

Guidance Celestial. It is a form of navigation using the celestial bodies as reference points. Early sailors used stars as navigational aids.

Guidance Inertial is a system of missile control, the sensitive elements of which system make use of the principle of Newton's second law of motion.

Guidance Beam Rider is a scheme of guidance in which the missile follows a radar beam to the target by means of missile computers and controls which are sensitive to radar beams.

Guidance Homing is a system wherein a missile steers itself towards a target by means of a self-contained mechanism activated by some distinguishing characteristics of the target.

Guidance Command is a system of guidance in which the vehicle is directed in its flight path by radio commands from a ground station.

Guidance station equipment is the ground-based portion of the ballistic missile guidance system necessary to provide ground-based guidance during missile flight. The equipment specifically includes the tracking radar, the rate measuring equipment, the data link equipment, and the computer and test and maintenance equipment integral to these items.

Guidance system. It is a system which measures and evaluates flight information, correlates this with target data and converts the resultant into parameters necessary to achieve the desired flight path of a missile and communicates this data in the form of commands to the missile flight control system. A guidance system may be self-contained within the missile or the function may be performed by various combinations of ground and airborne components.

Guided Missile is a vehicle, without man, moving above the earth's surface, whose flight path is capable of being altered

by means of a mechanism within the vehicle.

Hard base is the launching base that is protected against a nuclear bomb by a structure or terrestrial cover, which may be natural or man-made tunnel. A hard base is designed for a specified amount of pressure.

ICBM is abbreviation for International Ballistic Missile. Its normal range is 5,000 miles or more.

Ignition is the initiation of combustion of a rocket motor. A supporting flame is maintained and a low flow rate of primary propellants begins. As soon as the propellants begin burning property either an automatic or manual change over to maximum performance, burning is started.

Igniter is a device used to initiate burning of a fuel mixture of a propellant in a ramjet or rocket combustion chamber.

IM is abbreviation for Intercepter Missile.

Impact predictor is a system designed to predict the exact area in which a missile would impact during powered flight if its engine thrusts were terminated. The system is composed of tracking system, a highspeed digital computor and a plotting board at a specific place. Position data received by the tracking system are automatically relayed to the computer. The computer's output is relayed by cable to a plotting board monitored by a person in central control. If it appears that the missile might approach an unsafe area, the flight is terminated.

Interface. In *Radio,* communication interference is the disturbance of reception owing to stray or undesired signals. In *radar,* interference is the confusing signals accidentally produced on the indicator by the effect of either friendly or enemy electrical apparatus or machinery or by atmospheric phenomena.

Interference control is the monitoring or instructing of radio frequencies assigned to a missile range for detection of interfering signals that could result in malfunctioning of missile-borne equipment, and the concerted effort to locate and terminate the source of interfering radiations.

IOC is abbreviation for Initial Operational Capability.

Ionosphere is the portion of earth's atmosphere about 30 miles above the earth's surface which consists of layers of highly ionised air capable of bending or reflecting certain radio waves back to the earth. By means of this condition the transmission and reception of radio-frequency signals between two distant points is caused.

IRBM is abbreviation for Intermediate Range Ballistic Missile. Its range is usually considered about 1,500 miles.

Jet (Old French *Jaet*, latin *Jactare* to fling, frequentative of *jacere*, (to throw) means a sputing stream a spout at the end of a gas-pipe emitting the flame. It is the exhaust stream or rapid flow of fluid from a small opening or nozzle.

Jupiter is the surface-to-surface **IRBM** developed by the U.S. Army Ballistic Missile Agency.

Launch is the initial motion in transition from stationary (static) position to dynamic flight. *Launch pad* is a concrete or other hard surface area on which a missile launcher is placed in position.

Launcher is a mechanical device, which rigidly supports or "cradles" a missile in its proper launching position until the missile is launched. The device is either mobile or stationary. The missile is directed by it in the desired direction of flight during initial position. The launcher does not itself propel the missile.

Launcher, Zero Length is a specially designed launcher. It is usually slightly longer than the missile it supports, which can be adjusted, both in elevation and angle in order to control the missile heading at take off. It is well suited for tactical launchings on land and also aboard the ships.

Lift-off is the initial movement of a ballistic missile or space vehicle as its rocket propulsion raises it from the launcher. In case of aeroplane this action is known as "take-off."

Liquid propellant is a liquid ingredient fed to the combustion chamber of a rocket engine.

Main Stage. Full thrust level burning or main stage

burning in a liquid propellant rocket is the stage at which lift-off of the rocket takes place. The full thrust burning cannot be attempted immediately, it is done in stages, *viz.*, ignition stage, primary burning stage at which propellants at limited flow rates are ejected into the combustion chamber, and thirdly full thrust burning or main stage burning.

Nose cone is assembly at the forward end of a missile or rocket vehicle from which it is separated at the end of propelled flight. In a research space vehicle the nose cone has the satellite and instrumentation equipment, in a military missile it carries the warhead.

Operational Missile is a missile that, in contrast to a research and development missile, can be used to attack an enemy target.

Orbit is the path in which a celestial body revolves round another body as a planet moves about the sun or an artificial satellite about the earth.

Orbital velocity is in the velocity required to keep an object moving in a closed orbit around the sun, a planet, or other celestial body. Orbital velocity of the earth is about 300 miles per second or 18000 miles per hour.

Pad is a permanent or semi-permanent load-bearing surface constructed or designed as a base upon which a launcher can be based.

Perigee is the point in an orbit nearest the earth. The point in an orbit farthest from the earth is called apogee.

Polaris is the Navy's Fleet Ballistic Missile. It is a solid propellant IBRAM designed to be launched from a submarine or surface ship.

Programme. In missile guidance, programme is the planned flight events to be followed by the missile. All steps of the missile's guidance scheme and internal operations necessary to accomplish the desired objective are included in the programme of a missile. Programme is a schedule according to the time of significant events planned to take place during the flight.

Programme Turn is the turn of a ballistic missile from vertical motion, after lift-off, to a curved path approximating the desired powered flight trajectory prior to the initiation of guidance.

Propellant is any energy yielding material used to drive a vehicle. It may be either in solid or liquid form.

Radar. The word is derived from a contraction of the phrase, "*RA*dio *D*irection *A*nd *R*anging." It is an electronic device designed to transmit bursts of radio energy which receives reflections of that energy from objects. Through this device the time consumed in this transmission reflection cycle is accurately measured and converted to distance (range) from the radar to the objects. The highly directional nature of radar beams enables an accurate determination of direction to the object from the radar. The distance and direction information is indicated on instruments allowing an operator to locate the object in space accurately.

Red-stone is an army surface-to-surface missile with a 200-mile range deployed in support of U.S. forces in Europe.

Rocket is a thrust-producing system, or a complete missile. It derives its thrust from ejection of hot gases generated from material carried in the system, not requiring intake of air or water.

Satellite is an unpowered object which revolves about another body.

Secor is an electronic tracking system employing several ground stations and a transponder in the missile to measure positions of missile in flight.

Separation. In respect of multi-stage missiles separation is the time or place at which a burning stage is discarded and the remaining missile continues on its way.

Sky screen either electronic or optical provides a positive indication to the Range Safety Officer whenever the missile deviates from its planned trajectory. In operational use, one sky screen is used to monitor flight azimuth (the arc of the horizon between the meridian of a place and a vertical circle passing through any celestial body and another is used to

monitor vertical programming.

SM stands for Strategic Missile.

Snark is an air force surface-to-surface intercontinental air-breathing cruise missile used by the strategic air command.

Soft base is an installation on which facilities are functionally designed to accomplish an assigned object although it is not constructed to resist overpressure, heat, radiation, penetration of other weapon effects which may be anticipated under enemy attack.

Stratosphere is a calm region of the upper atmosphere where there is little or no temperature change with a change in altitude. The stratosphere is separated from the lower atmosphere, or troposphere the tropopause; ozone is an important part of the stratosphere which plays a vital role in the phenomenon of selective absorption. Ozone seems to have a significant correlation with surface weather conditions. The stratosphere is free from the clouds and convective currents of the troposphere.

Static firing. A missile is tied down to its test stand and all its operation functions, including ignition and run up of the propulsion, are tested.

Telemetering system is a method of taking measured valves within the missile and transmitting these valves electronically to a ground station. The information that is received at the ground station is used to evaluate the internal performance of a missile in flight.

Telemetry is the radio link between a missile and the ground station. It is used to transmit information under telemetering system.

Theodolite. On the range a conventional transit or theodolite is ill adapted to recording missile position during flight. Accordingly, the theodolites for range use have evolved into cine-theodolites and photo-theodolites. The photo-theodolites differ from cine-theodolites such that cine-camera is replaced by a precision, fixed (glass) plate camera in which a large field is viewed and many exposures are made on the arc plate of the missile as it moves through the field of view.

Thrust is the driving force which is exerted on a rocket or missile by its jet or rocket engine or engines or other propulsive force.

TM is abbreviation for Tactical Missile.

Trajectory is the path of a missile or space vehicle, moving in space from the time it leaves its launcher till it completes its flight.

Transponder is an electronic device designed to receive a challenging signal and to automatically transmit a response.

Tropopause is the transition or boundary zone between the stratosphere and the troposphere.

T. Time is the time of lift-off of a missile from its launch pad.

Turbojet is a jet motor. Its air is supplied by a turbine driven compressor. The turbine is activated by exhaust gases from the motor.

Warhead. Normally warhead is that fall of a missile which contains an explosive, chemical or other change intended to damage the enemy. The missiles under test are devoted completely to instrumentation equipment which records performance of the missile under test.

Chapter 13

MAIN LAWS OF HUMAN HEALTH

"Prevention is better than cure"

Health is the state in which the body functions normally. This condition finds the body free from disease, with all organs and component parts of human structure performing their functions properly and in correct balance. There are five main laws of health—good food, pure air, cleanliness, suitable dress, proper exercise and rest.

FOOD

Necessity of food. Life is a condition of dynamic equilibrium—that is, a balance of the two opposing forces of destruction and repair. In other words, human system is in a state of constant change. When either of these two forces outweighs the other, the balance is lost and in adult life, at any rate, the condition becomes one of ill-health. The object of food is to repair the waste of the tissues (the substance of which the tissues are made) incessantly going on during life. The food taken is consumed in moving and heating the body. And just as it is important in boilers to burn good coal, so in the human body it is essential for health to have good food.

Analysis of our food. All our food is directly or indirectly vegetables, save a small amount of minerals in salts and water. Meat and fats are derived from animals that are vegetable seeders. Chemistry tells us that vegetables are made up of starch (the pure fecula or white farinaceous matter of vegetables) and albumen (a substance like the white of an egg, found in animal and vegetable bodies), which in turn are made up of air, water and earth. The four main elements of life—oxygen, nitrogen, hydrogen and carbon—are built up by inorganic nature into air, water and earth.

Chemical components of air, water and earth are carbon, oxygen, hydrogen and nitrogen.

Carbon is the fuel of the body, as it is of all the earth. It is the body-warmer and body-worker. Two of the foodstuffs, *i.e.*, one vegetable and the other animals, really depend upon this element. The starch, flour, sugar form a large proportion of our food and carry cn all the mechanical work of the body by giving out as it is needed, the necessary force for this purpose. Fat, butter and cream keep up the heat of the body.

Oxygen is gas. It is the breath of life and it enters into all we eat and drink. We derive our principal supply of it from the air through the lungs, rather than from the food through the stomach.

Hydrogen, though forming a part of starches, sugars, fats, etc., is one constituent of water of which by far the greater part of body is composed. Without water there can be no life, any tissue that dries dies. Hydrogen, therefore, (in combination with oxygen) may be taken to represent principally the fluid of the body.

Nitrogen, the inter-gas, is the essential element in all life. It forms a great part of the body cells themselves, and even serves as food to repair such waste of these cells as is perpetually going on. Nitrogen is found principally in animal food, whether meat, fish, flesh or fowl. It also occurs in smaller quantities in grain, corn, beans, peas, etc., and is also the great agent in forming flesh. Nitrogen exists also in enormous quantities in the air, but we cannot assimilate it, *i.e.*, receive, retain and use it in the body as a gas, otherwise the whole food problem for the world would have been solved. For nitrogen, for our purpose, we depend upon the vegetable kingdom which can alone store up nitrogen in the form we can eat it.

Broadly speaking, there are four kinds of foodstuffs : the *flesh-formers* or repairers of used-up tissues are mainly the meat and salts; *the body-warmers* (to be burnt up to heat the body) are mainly the fats—or the *body-workers*—to be consumed in mechanical work, are the starch or sugar. The *mineral food* is principally used to dissolve the rest. If these foods are taken in the right proportion, the first law of health is fulfilled but suitable proportion is important. If we eat too few flesh-formers and too many body-warmers and workers we get fat and feeble. If we eat too

few body-warmers and workers and too many flesh-formers we get lean and lively.

Essentials of food. The food must include sufficient quantity of a well-balanced mixture of carbohydrates and fats to provide by its oxidation, all the energy required for both the internal basal metabolic processes of the body, and also for the external physical work that the body performs. It must also contain sufficient of such proteins as, on digestion, yield in appropriate proportions the amino-acids that the tissues require for the replacement of their losses during wear and tear or for any growth that may have taken place; and lastly, it must contain small but sufficient quantities of the so-called vitamins and organic mineral salts for continued health.

Well-balanced diet. We have seen that certain elements are necessary in our food for the proper replenishment of the waste that is perpetually going on and that they must be combined in proper proportions so that no one part of the body shall be over-nourished at the expense of the other, no organ over-taxed but that all may be harmoniously developed. Since the elements are seldom, if ever, found in the proper proportion in any food substances, it becomes necessary to exercise judgement in selecting them, so that something like a well-balanced diet may be obtained.

Authorities differ as to the actual proportion the nutritive ingredients should bear to each other in the daily diet. But on a comparative study of statements advanced by different food experts, the following is considered to be a fair average of the various tables. It may be noted that 100 parts of the carbohydrates is taken as the basis of calculations, the figures opposite the other ingredient representing the proportion they should bear to the basic figure.

Carbohydrates (carbonaceous material, starch, sugar, etc.) fat and heat-formers ..	100 parts
Proteins (nitrogenous material) muscle, tissue and brain-formers ..	40 ,,
Fats (animal fats, butter, etc.) fuel-formers ..	32 ,,
Mineral salts	6 ,,
Water	670 ,,

With the above table in mind it becomes easy to select

foods that will furnish, when combined, the proper proportion of each ingredient, that is approximately, and to assist in the selection. A condensed list of more important articles of food showing the percentage of each ingredient is given below. For practical purposes it will be found sufficiently correct.

In 100 Parts.

	Proteins	Starches	Fats	Sugar
Wheat Flour ..	11.6	71.0	1.3	1.0
Barley ..	10.5	66.7	2.4	2.6
Oatmeal ..	12.8	65.6	5.6	3.6
Potato ..	2.2	21.8	0.2	1.0
Rice ..	7.4	79.4	0.4	..
Turnips (*shalgham*) ..	1.0	6.9	0.2	..
French Beans ..	23.7	55.6	2.2	3.7
Lima Beans ..	21.9	60.0	1.9	2.9
Green Peas ..	6.3	12.0	0.5	0.8
Lantils (*masoor*) ..	24.8	54.7	1.8	2.4
Mushrooms ..	2.5	4.7	0.2	0.7
Beef (*gai ka gosht*) ..	20.2	0.0	3.6	2.0
Mutton (*bher bakre ka gosht*)	17.1	0.0	5.7	1.3
Fat ..	16.9	0.0	20.0	3.1
Poultry (*murgh, murghi*) ..	21.0	0.0	3.8	1.2
Veal (*bachhre ka gosht*) ..	18.8	0.0	4.4	0.5
Cod ..	27.0	0.3	0.3	22.0
Yolk of Egg ..	16.0	0.0	30.7	1.3
White of Egg ..	20.4	0.0	0.0	1.6
Cow's Milk ..	4.2	4.5	3.7	0.7
Cheese ..	28.0	1.0	23.0	7.0
Butter ..	2.0	1.0	85.0	1.0
Cabbage (*gobhi*) ..	5.0	7.8	0.5	1.2
Sweet Almond (*badam*) ..	23.5	7.8	53.0	3.0
Walnut (*akhrot*) ..	15.8	13.0	57.4	2.0
Apple (*seb*) ..	0.4	7.2	0.0	0.7
Grape (*angur*) ..	0.6	14.2	0.0	0.5
Banana (*kela*) ..	4.9	19.2	0.6	1.1
Dates (*khajur*) ..	6.6	54.0	0.2	1.6
Figs (*anjir*) ..	6.1	60.51	0.9	2.3
Honey ..	0.8	74.6	0.9	0.2
Sugar ..	0.3	96.7	—	0.8

When to eat? Food should be taken at suitable intervals, so as to give the stomach time to get rid of one meal before next is introduced, otherwise the undigested food remaining in the stomach prevents that organ from acting properly on the fresh food, and, as a consequence, digestive troubles arise.

How to eat? Food should be thoroughly chewed. The idea is to see that the saliva, which converts the starchy matter in food into glucose and is necessary for digestion, is brought into intimate contact with every part of the bolus. Moreover, the separation of food into small fragments by the teeth assists stomach digestion, by permitting the gastric juice freer access to the food.

Drinking at meals should be avoided as far as possible. More digestive disturbances are accompanied by imperfect secretion of the gastric (pertaining to the stomach) juices, and to make them thinner or more liquid is to weaken its power of action on the food. The drinking of iced water at meals is still more dangerous.

All condiments (*masale*) promote indigestion. They over-stimulate the stomach exciting the secreting glands to abnormal action and irritating the sensitive mucous surface.

Vitamins. *Vita* means life. Vitamins are essential accessory factors of diet. In 1906, Hopkins pointed out that life cannot subsist purely on proteins, fats and carbohydrates, mixtures. The absence of minute quantities of vitamins leads to profound disturbance in our bodies. Numerous diseases such as scurvy, beri beri, rickets, carious teeth, night blindness, pellagra, otemalacia, constipation, anaemia are attributed to the cause. It is usually believed that vitamins directed the adequate utilization of protein fats, carbohydrates and minerals. So far only some of them have been separated in pure state and the knowledge about the rest is still obscure. On account of ignorance about composition of all vitamins, to distinguish one from the other, the vitamins are known by the alphabet: A, B, C, D, E, F, G, K. Surely there are more vitamins, perhaps, even more than A to Z.

Vitamins are destroyed by over-cooking food articles.

Deficiency or want of vitamins produces and causes the body to work unwholesomely. We can prevent certain ailments of the body by eating food containing the necessary vitamins. A knowledge of the vitamin contents is, therefore, very useful in determining a suitable diet.

Vitamin A is present in green leafy vegetables. Animals and fishes that subsist on them store this vitamin in their liver and secrete in their milk. Rich sources of this vitamin are milk, butter, liver, fish, egg-yolk, mutton, green vegetables like lettuce (*sagg*), cabbage (*gobhi*), turnip (*shalgham*), carrots (*gajar*), radish (*muli*), wheat flour and unpolished rice. Vitamin A is destroyed by heat, by long exposure to atmosphere and by chemical treatment. It is believed that this vitamin protects the mucous lining of the eyes, nose, intestine and lungs and thus fortifies the body against infection. Deficiency of this vitamin is responsible for many cases of stunted growth, inflammations of mucous lining in the eye, night blindness, colds, dysentery, susceptibility to T.B. infection, pneumonia, stone in the bladder and impairment of function of intestinal tract.

Vitamin B nourishes mostly the nervous system, keeps the heart, liver, kidneys, muscles strong and increases appetite. It is found in yeast (*khamir*), celery (*ajvain khurasani*), tomatoes, walnuts, asparagus, water cress barley, maize, nuts, mushroom, brain, heart, liver and kidneys. It can be dissolved in water. Its deficiency causes indigestion, irritability, weakness, dull-headedness, heart-failure and various other nervous changes. Diseases like beri beri, pellagra, spure and acrodynia are also caused by the deficiency of this vitamin. This vitamin is necessary for proper digestion and assimilation of food.

Vitamin C is present in fresh green vegetables, sprouted grains, tomato juice, orange juice, cabbage and posto-creams. Its deficiency gives rise to bleeding in gums and under the lining of bones which makes the limbs painful.

Vitamin D is present in milk, butter, *ghee*, egg-yolk and fish oil. It can be produced also by exposing skin to the sun. This vitamin helps to form strong bones. Deficiency of this vitamin gives rise to softening of bones carious teeth, increases hyper-excitability of nervous system, and causes rickets (a

disease of children characterised by softness and curvature of bones).

Vitamin E is present in wheat, germ oil, lettuce and water cress, and in most of the food-stuffs. Its deficiency gives rise to atrophy and is one of the causes of abortion (*hamal girna*).

The functions of vitamins F and G are probably allied to vitamin B and vitamin K and vitamin P to vitamin C.

WATER

It is a fluid or chemical compound composed of hydrogen and oxygen. Water is a great factor in the healthy human existence. It is the principal agent in the elimination of waste material from the body according to Nature's plan. Some two-thirds or three-fourths of the weight of our body consists of water. It is not possible for our body to function without water for a considerably long period. Water is never found to be absolutely free from organic and inorganic matter, except when it is formed by chemical combination of oxygen and hydrogen by the formula H_2O. The substances generally found in water are harmless and may indeed be sometimes useful for their digestive and invigorative properties. But at the same time, water supplies are liable to be contaminated by decayed and decomposing vegetation; and to harbour the eggs and larvae of countless insects and disease germs. Such water supplies, whether public or private, are very harmful for health. It is, therefore, necessary that water should be adequately freed of its harmful influences.

AIR

Air is a mixture of oxygen, nitrogen, carbon, argon helium. In air, unlike water which is a chemical compound of gases forming a liquid, the gases are intermixed like sugar and sand, and merely form a mixture of gases without chemical change.

Pure air. We cannot live without air. Air is a vital necessity to human organism and the fresher it is the better. But it cannot be quite fresh. The oxygen gas in the air is the vitalizing element. The blood particles, when they enter the lungs through the capillaries (the minute vessels that unite the

veins and arteries), are charged with carbonic acid gas (which is a deadly poison), but when brought into contact with the oxygen, they immediately absorb it after ejecting the carbonic acid gas. The oxygen is at once carried to the heart and by that marvellous pumping machine sent bounding through the arteries to contribute to the animal heat of the body.

It is the pure air that we require for sound health. It is more especially during the hours of sleep that fresh air is needed, for that is when Nature is busiest in repairing and building up and calls for larger supplies of oxygen to keep up the internal fires, but her efforts at repairing waste are rendered futile if you diminish the supply of the vitalizing element and compel her to use over again the refused material she has already cast off. Early morning walk is very useful for health. Air is quite fresh at that time. In physical exercise we take in more fresh air, which purifies the blood and improves health.

Impure air. Just like water, air may also sometimes carry disease germs in it. Impure air is generally found in the atmospheres round big cities, rendered impure by smoke of chimneys of factories and houses, the gases from the breaking up of various chemicals, the carbon dioxide from the exhalation of men and animals, etc. Miserable, dark dungeon-like rooms, inadequately ventilated, often shared with animals and not uncommonly fixed with the products of complete and incomplete combustion (poisonous carbon monoxide gas, in the latter case) and of respiration, bring about pale, lean faces. The constant breathing of impure air produces blood-poisoning of the most profound description known as anaemia (deficiency of blood).

EXERCISE

Motion is life. The health of the mind and body depends upon it. Inaction is the theory of destruction. Inaction means stagnation and condition fatal to health. Disuse is as fatal to a piece of machinery as excessive use; in fact, it is far more likely to rust out than to wear out. Feeding oneself without moving limbs sooner or later confines a person to bed. Diminished movements reduce requirements of body and retard growth. Officials and business-men who live seden-

tary life and sit all day at the desk or behind the counter scarcely getting a few moments for hurried meals, accumulate fat and mostly suffer from indigestion.

Before the dawn of civilization mankind was not troubled by the need for exercise. Our forefathers, in the dim ages long past, *had to do exercise to live*—get their food, fight off enemies. Today we no longer depend on hunting and fishing for food. Matters have undergone a radical change. In urban life we have to sit at desks, in shops from morning till evening. We ride in automobiles, trains, elevators; and the result is that most of us do not get the amount and variety of physical activities which the human body needs. Exercise serves a wide variety of physical needs.

The young and healthy should take plenty of exercise. But no one should exert himself to the point of exhaustion: healthy tiredness is a very different matter. At least two hours should be allowed to elapse after eating has finished before the exercise is begun. That does not apply to short walk or to ordinary activities. A long walk before breakfast may be absolutely injurious to some people, though to those in perfect health it is recommended strongly.

There are various types of physical exercises. The advantages of walking, riding, swimming, playing and the like call for no comments, suffice it to say that exercise in any form if taken systematically is essential for the upkeep of one's health. It may, however, be pointed out that an average man need not take strenuous exercise. Violent exercise if taken might do more harm than good.

CHAPTER 14

COMMON HUMAN DISEASES

Ill-health occurs when the balance, the equilibrium of destruction and repair is lost and the weight in scale of life is greater on one side than the other, generally on the side of destruction. When it is entirely on this side and repair has ceased altogether, the result is death.

Common causes of ill-health. Ill-health may be on account of want of proper exercise and rest. Excess of work frequently goes with too little rest and constantly produces breakdown. Few need eat bad food or drink to excess or breathe foul air, or drink dirty water, or wear insufficient clothes or deny themselves sufficient rest. The more one looks on the list the more apparent it is that our health is in our own hands. Bad health is almost invariably the outcome of ignorance, carelessness, wilful neglect or superstition.

Ill-health is really the result of two factors—the power of resistance and the power of attack. The first factor, resistance to disease, depends upon the condition of the individual which makes him more or less vulnerable to attack; the second factor, the force of attack, depends upon the character of the attack.

Causes of diseases. Disease (dis-ease) is a deviation from normal health: may be structural or functional. Bad food and drink causes diseases. Impure air includes all germladen atmosphere, and causes infectious diseases. Changes of temperature in the air are also a cause of chills of various organs with their attendant evils. The absence of cleanliness in drinking water is the chief cause of typhoid cholera. "The primary causes of all diseases, excluding accident, is violation of Nature's laws in one way or the other. The state of disease may be produced by overeating, the constant purging with mineral poisons, by wrong combinations of food, by the absorption of chemicals used in adulteration of foodstuffs,

by de-natural and de-mineralised food which have the important vitamins and mineral salts taken out of them, by inherent taints and tendencies, by suppression of disease, by poisonous drugs, vaccines, serums; by morbid and violent emotions; by lack of hygiene; by mechanical misplacements such as misplaced vertebrae which may impinge the normal nerve flow, and by suppression of natural emotions."

Prevention of disease.

1. Modify susceptibility by protective inoculation.
2. Attend to health measures against specific causes.
3. Isolate a diseased person.
4. Isolate and watch every person for 14 days and destroy all infected clothing.
5. Always notify an outbreak of disease to schools and close them to epidemics.
6. Revaccinate persons over 14.
7. Disinfect all clothing, furniture and rooms. All clothes and linen, etc., should be boiled before being sent to a laundry.

Cure of diseases. We may cure a disease by medical treatment which is combative, or by the natural method which aims at the removal of the cause. Medical treatment advocates killing of the germs by means of poisonous drugs and medicines, by vaccines and serums, and in some cases by surgical removal of diseased organs. The actual cure of disease lies is understanding the cause of disease and realising that disease is a growth which feeds on poisoned soil, and that the poisoned soil is usually caused by eating of de-natural foods, excessive amount of food, eating to keep up strength when ill, and false teachings which lead people along wrong lines. The germs themselves do not cause disease. If there is any filth in the human body, then germs will appear, because they live on filth.

Unnatural living fills blood stream with poisonous waste materials which, if allowed to accumulate, will, in time, thicken the blood until it cannot flow through some of the smaller blood vessels. If the eliminative organs do not take care of the

waste, there will come a time when it precipitates or settles in the tissues of the body. After a course of natural treatment the vitality of the cells of the body are raised to the point where systematic waste can be thrown off. This waste is then collected by the blood stream, and the patient experiences a temporary recurrence of his old aches and pains. This marks the beginning of a healing crisis, which if left to run a natural course proves very beneficial.

The Natural Cure School goes as far as to claim that in acute diseases water treatment will accomplish all the beneficial effects which old school practitioners ascribe to drugs and that much more efficiently and without any harmful after-effects upon the system.

Appendicitis is the inflammation of the vermiform appendix of the caecum. The pain usually begins in the 'pit of the stomach' or near the navel. Very often it is followed by vomiting if the person has eaten anything. Thereafter the pain spreads to the right side of the navel, and fever develops. A competent surgeon should be consulted for surgical operation to remove the diseased appendix. No food or water should be taken until a doctor examines the case.

Beri Beri. It is an inflammation of the nerves all over the body which occurs in hot climates. It is believed to occur from having eaten diseased fish or from living for a long time on food devoid of sufficient nourishment such as husked rice. A sea-voyage is the best method of cure with plenty of nourishing food. Rest is also necessary.

Bites of snakes and rabid animals and wounds by poisonous weapons. A constriction should be placed immediately between the wound and the heart so that blood may not carry poison through the body. Bleeding of the wound should be encouraged for a while either by washing the wound with warm water or by keeping the injured limb low. The wounds should be burnt with a caustic or hot iron (cauterised). After a while the wound should be covered with a clean dressing so that disease germs may not flourish on account of flies, etc. The services of a doctor should be obtained very early.

Catarrh (*Zukam, nazla*). It is a mild form of influenza.

There is no fever in this disease. Influenza is a violent form of catarrh and entails fever in addition to other symptoms. It is inflammation of the mucous (the slimy fluid from the nose) membrane particularly of the passages of the head and throat. It is the most common of all diseases affecting the respiratory organs and the passages leading to them. If neglected it steals down the wind-pipe and produces hoarseness and soreness of the chest. If still neglected it may travel along the lungs and become bronchitis (*halq ki sozash*) and it may continue still further and become inflammation of the lungs, so that a neglected catarrh may in weak persons end in pneumonia.

The causes are generally a mind specific germ that invades the air passages, coupled with a chill of some sort which lowers the resisting power.

The symptoms are running at nose and perhaps eyes, hoarseness, sore throat, weakness, aching of head, pain across the forehead, a slight rise in temperature. The mucous membrane is in a state of great irritation and pour forth a copious liquid secretion at first. It gets scantier and thicker as the disease advances.

Precautions are the same as in the case of influenza. There are various methods of treatment. Use of a nasal spray with eucalyptus, menthol, etc., is useful.

Chicken-pox. It is an illness which attacks children and young people under ten years. The patient never suffers from the disease twice. But an attack of chicken-pox does not protect from smallpox. The two diseases have nothing in common except a slight similarity in the accompanying eruption. Chicken-pox, although very infectious, is not considered dangerous.

When chicken-pox attacks a child he feels ill and the eruption shows itself in about twenty-four hours. It consists of numerous small pimples which appear on the neck, back and shoulders. They mature on the third day and then die away. The complaint lasts only a few days. Unlike smallpox, no marks are left on the skin. The patient should be kept in isolation lest others should be infected. Care must be taken to guard against chill, otherwise there may be complications.

Cholera (*Haiza*). It is caused by a minute germ conveyed into the body through water. It usually occurs indirectly from contamination (pollution or mixing) of water, milk, food by the infection from a cholera patient. Unripe or over-ripe fruits, exposed liquid foods and water in the streets, adulterated milk, curd, butter, cheese, ice-cream are all potential dangers in the days of a cholera epidemic. We eat cholera and drink cholera and cannot "catch" it, that is through the air. Water at common places and holy places where people suffering from cholera wash and then drink the water, propagate this disease so easily. Slightest neglect in the proper disposal of stools (*dast:* discharges from the bowels) of the patient may propagate the disease in the form of an epidemic, for the stools may attract flies which transfer the disease germs on their wings and legs. Flies also play an important part in conveying the disease by infecting the food articles. Cholera is a filthy disease. It is an endemic in lower Bengal and Central Asia. It is most fatal among negroes. It is most common in autumn and reappears in spring. Winter stops it.

The symptoms of cholera are frequent vomiting, diarrhoea (excessive looseness of bowels, purging, *dast;* cramps (the involuntary and painful contractions of voluntary muscle or muscles, restraint: *maror*); suppression of urine, which occurs in the first stage of the disease.

All drinking water must be boiled and no unripe or over-ripe fruit, uncooked vegetable or shell-fish, should be eaten when there is a danger of cholera. Measures should be adopted for preventing the flies getting into houses as they carry the infection. All diarrhoea should be disposed of properly. The sick and suspected should be isolated. All clothing or other articles which come into contact with a sick person require careful disinfection. Inoculation by anti-cholera vaccine should be made. Clean houses and clean localities go a long way to prevent this disease. Public health authorities should be informed of a cholera case so that they may take preventive measures against its spreading. The main step against cholera is prevention rather than cure.

The patient should be kept warm with blankets and hot-water bottles and given small lumps of ice to suck. Small

quantities of milk and strong beef-juice must be administered frequently, but no solid food. It is an illness for which a doctor should be summoned at once and his orders obeyed strictly.

Coma is a state of partial or complete unconsciousness. The comatose person cannot be roused. It is the result of pressure on the brain which may be caused by some disease or an accident.

Constipation (*Qabz*) is irregular and insufficient action of bowels or it is infrequent and difficult evacuation of the contents of the bowels. Constipation is one of the important underlying causes of practically all diseases. Its causes are varied—insufficient exercise in the open air, hastily eaten and imperfectly masticated food.

Everything should be tried before drugs are used to relieve the condition. Plenty of fluid should be taken after the meals ; eating and drinking should never actually go together. A glass of cold water at bed-time and another at rising go a long way to relieve one from the trouble. A daily walk and regular exercise is very useful. In case, however, simple remedies do not suffice, a laxative medicine may be used. But this is for occasional use only; the habit of taking an aperient regularly should not be formed otherwise a temporary functional disorder may become a permanent disability.

Cuts. The dirt should be washed from the wound with any anti-septic lotion. Tincture iodine or garlic or *neem* water should be applied and the wound should be bandaged.

Diabetes is a disease of the pancreas, which is caused by the inability of the body to make use of sugar present in the food, and it therefore accumulates in the blood and is then passed through the urine.

The symptoms of the disease are general debility, loss of weight and excessive hunger and thirst.

For cure, controlled diet and insulin injections are necessary. The disease may be cured at its early stage. It is very difficult to check diabetes at its advanced stages.

Diarrhoea (*As-hal, dast ki bimari*). It is simply Nature's method of getting rid of undigested substances in the alimentary tract. After a time, the irritation excites the glands to abnormal action to wash out the offending substances, resulting from excessive fermentation a gaseous change that takes place in certain substances). If not relieved, ulceration sets in and germs breed in the intestines—then we have what is known as chronic diarrhoea. The diarrhoea which attacks children, when teething, is generally due to error in diet.

In ordinary cases the best remedy is a stiff dose of castor oil. This frees the bowels of any irritant and has a tendency to check their action afterwards. One should not attempt to stop the diarrhoea by opium as is done sometimes. This may prove dangerous.

Dysentery (*Pechash*) is characterized by passage of stools with mucus (slimy fluid or mucus and blood accompanied by straining and pain in the abdomen. The abdomen is usually swollen and there is a frequent desire to evacuate the bowels. It differs from diarrhoea chiefly in being attended by marked fever and pain as also by the presence of blood and inflammatory matter in the discharges. There are various types of dysentery of which the most common are *amoebic* dysentery and *baciliary* dysentery. The former is caused by an amoeba and the latter by a bacillus. They enter the body in food or drinking water.

In order to prevent the disease, well-cooked and solid food should be eaten. Pure water should be used. If necessary, all drinking water should be boiled. One should not eat with a person suffering from dysentery.

Medical attention is absolutely necessary in this disease. Amoebic dysentery usually tends to be chronic in its course and requires specially expert treatment for its cure. It is cured by injections of emetine. Baciliary dysentery is cured by injections of anti-dysenteric serum. Enemas are prescribed in many cases.

Dyspepsia (Indigestion ; *bad-hazmi*). Indigestion is chiefly due to overeating or taking an ill-balanced food. The disease is marked by discomfort and pain in the abdomen

(the lower part of the belly), headache, palpitation of the heart and sometimes vomiting. It is the penalty which Nature inflicts for violating physiological laws.

The prevention lies in not eating too much. One should eat rather less than he feels he requires. Plain food eaten at regular hours is of first importance in all forms of indigestion. Plain food should be eaten at regular intervals. It should be well-masticated and no fluid should be taken during the meal, whatever is to be drunk may be taken afterwards. Fat and greasy dishes are always injurious.

Epidemic (*Aam waba*). An epidemic disease is one that attacks great numbers in one place at one time and itself travels from place to place, as for example, cholera. It may be contagious or infectious.

Endemic (*kisi khas tabqa ya zila ke mutalliq*). An endemic disease is always present, to some extent, in a particular locality, certain area or region. This is due to local insanitary conditions. An endemic disease is apt to flare up and become epidemic.

Fevers. Right from the beginning of life, Nature tries to cleanse and purify the infant body of its hereditary disease taints and morbid encumbrances through acute eliminative processes, such as skin eruptions, coughs, and mucous discharges from the nasal passages and others. Fever is Nature's way of burning up foul material in the body, and if there is no stuffing or medication to suppress the fever, the Nature will carry the waste material out of the body and leave it in a far more healthy condition. Take the case of typhoid fever. There is usually a history of stomach disturbances previous to the acute reaction we call typhoid fever. The intestinal tract becomes acutely inflamed and the inflammation is more concentrated in a part we call peyer's patches than at any other portion. In early stages there is a tendency towards breaking down the patches and a change into open sores and/or ulcers. During the three weeks of acute inflammation of typhoid fever Nature makes an effort to burn up, so to speak, the refuse which has accumulated in the alimentary tract—refuse which is good soil for the grown germs. Nature does not aim at suppressing the fever but allows it to burn up the refuse at the

same time keeping it under control. The temperature, which should not be above 103°F., helps in destroying poisons that have accumulated in the interspaces.

Nature-cure practitioners claim that the suppression of fever by patent medicines and by the use of medicines, supplied by some firms for the suppression of fever, lays the foundation for other diseases. They know that fever is really beneficial when handled in the natural way and leaves the body clean and free from disease.

Headache. There are many causes for this distressing complaint. Generally, the cause is to be found in the stomach. Something that has no right to be there, is in that organ and irritating the pneumo-gastric nerve that connects the stomach with the brain. Sometimes headache is present at the commencement or during the infectious diseases, *e.g.*, influenza and smallpox. Headache is a common symptom in diseases relating to the kidneys (*gurda*). It may be due to eye-strain or excessive brain work.

For serious cases a doctor may well be consulted. But in most of the cases constipation is to blame and that must be combated. "When headache has begun, the sufferer should lie down in a darkened room and sip a little cold water or soda-water. Food should be avoided altogether especially the cup of tea and piece of toast." Fasting is required to enable the stomach to do its work properly. To prevent the recurrence of the attacks, outdoor exercise should be taken and constipation avoided.

High Blood Pressure. The pressure of blood at one or many points of the body becomes abnormal which is a grave symptom. Headache, sleeplessness, fatigue and giddiness, and a feeling of sickness are some of the earliest symptoms indicating high blood pressure. The high blood pressure may result from several different causes. The important of these are: (*i*) Temporary conditions such as excitement, unusual mental or physical efforts, over-eating, dissipation, too much coffee, tea, tobacco, or alcohol: (*ii*) Arteriosclersosis or hardening of the arteries; (*iii*) Bright's disease and certain forms of heart disease.

Some precautionary measures are necessary. As quiet a life as possible should be led. It should be free from business cares, worries and anxieties and responsibilities. Control of nervous system should be cultivated. One should not lose his temper or worry unnecessarily or think too much about his troubles. The use of alcoholic beverages of all sorts must be stopped. Tobacco should not be used. The use of coffee, tea and spices should be stopped altogether, or be very simple. Over-eating must be avoided. It is best to use meat only two or three times a week. Those who are very heavy should try to reduce their weight. Constipation must be overcome.

Hydrophobia or **Rabies** is a disease contracted by human being from the bite of an animal suffering from rabies, generally a mad dog or a cat. It is due to contagious or poisonous matter present in the saliva (*luab*) of infected animals. It is characterised by fever, restlessness, swelling of the glands in the region of the bite followed by suffocating feelings and involuntary contraction of the muscles of the mouth and throat. It can be cured by inoculation with a series of injection of rabies' vaccine discovered by Pasteur.

Infectious diseases. Infect means to taint, especially with disease, to corrupt, to poison. Infectious diseases are communicated through breathing the same air, whereas contagious diseases are those which are liable to be contracted by people who come into direct contact with the sufferer.

The germs of infectious diseases are communicated from one person to another either directly as by actual contact or through infected food, towels, cups, spoons, etc., or insects such as mosquitoes, fleas, bugs, lice.

As soon as the germs of a disease enter into human body, they try to establish themselves against whole resisting phalanx of the body. They try to get the upperhand. In case they succeed to establish themselves in the battle-field of the body, they release their peculiar poisons or toxins which produce the symptoms of the disease. During the period of this struggle the body cannot ingest much heavy food, because its efforts are concentrated on fighting the invaders and consequently

the stores of the fatty tissues which are accumulated during the healthy period of life are used up. That is how the patient becomes weaker and thinner. In case the body fails to produce potent anti-toxins to neutralize the toxins, the crisis stage is reached and the patient yields. The object of medical treatment is to see that the resisting powers overcome the invading bacteria. If it succeeds, the disease begins to decline and the patient begins to recover health.

Vaccination with different types of vaccines is very helpful in most of the infectious diseases. But side by side with actual cure, must go the preventive measures against communication of the disease from one patient to other persons. The general cleanliness, disinfection of the clothes, room and excreta of the patient and the minimisation of contact of the sympathising relatives with the patient are quite useful to him. Moreover, that avoids a propagation of the disease. The patient should be set apart, preferably in a well-ventilated room on the uppermost storey. Sunlight, fresh air, and cleanliness are very effective; natural disinfectants, because they are inimical to the growth of bacteria. The excreta of the patient are a potential danger if discharged straightaway into the drain. They must be effectively mixed with some strong disinfectants before they are disposed of. The convalescent stages are still more dangerous for the spreading of disease and require proper precautions to be continued.

Influenza (*Zukam, sardi ka bukhar*). Influenza or the "influence of the stars or weather" is caused by the pressure of a microbe which has a period of incubation, the period between the implanting of a disease and its development of forty-eight hours. It attacks the nose, throat and chest. Influenza is a violent form of catarrh. The disease is highly contagious carried from person to person directly by "dust infection" as in coughing, sneezing and even in conversation. The incubation is from two to seven days.

The symptoms are shivering, pains in the limbs, fever, prostration and depression and headache and though the disease is serious itself, it is the after-effects which are more to be feared.

There are three conspicuous varieties of it—respiratory, digestive or intestinal and nervous. *Respiratory* influenza is confined to the nose and throat; the fever is high; the nose runs, and the eyes become blood shot. There is cough which is dry at first, but is accompanied by profuse expectoration as the symptoms of bronchitis appear. *Intestinal* influenza begins with vomiting, nausea (any sickness of the stomach with a tendency to vomit, loathing) and pains in the abdomen, in addition to the headache and pains in the limbs which distinguish the other type. The tongue becomes coated and diarrhoea sets in. This type of disease usually yields to treatment in a few days and is not so serious as the others. In *Nervous* influenza the symptoms are those of the respiratory type, but the patient becomes sleepy and desires being left alone.

The patient of influenza should be isolated as far as possible. Patient's clothes and sick-room should be thoroughly disinfected after recovery. Secretions from mouth, nose, etc., should be burnt. During the epidemic, it is much better to avoid churches. Public meetings should be avoided. Where it rages large, gatherings should be forbidden. The patient should take rest both bodily and mentally.

Insomnia is sleeplessness caused by mental or physical exhaustion, worry, excitement, nervousness, etc. The best cure is to remove the cause of insomnia. However, hot bath, drinks, use of medicines that lighten irritation or pain produce good results in many cases.

Jaundice (*Yarqan*) is a disease characterised by a yellowness of the eyes, skin, etc. It is caused by bile which affects the eyes causing an eruptive disease in the skin.

Malaria. It is caused by the bite of a mosquito, a species of anopheles, found in warm climates, drying marshes, stagnant pools and fens or marshy countries. The malaria germs (parasites) are introduced in the blood. Malaria is thus common where there is much moisture and decomposing vegetation. It is least common in winter.

The first symptoms are headache, chilliness, and slight

rise in temperature, but no actual fever. The symptoms increase and in severe cases, the patient has to go to bed shivering and blue with cold even though blankets may be heaped on him and hot bottles applied. High fever follows, with sickness and pains all over the body, and perhaps delirium. When malaria fever is in declining stages profuse perspiration breaks out, the headache and pains go and the patient recovers, although general weakness continues for some days. The attacks may be more severe or more slight but the general outline is the same. The fever occasions severe fits which tend to reappear every other day, or every third day according to the nature of the infecting parasite.

The preventive measures against malaria consist in the destruction of mosquitoes, by sprinkling kerosene oil on the surface of water pools and lakes and by cultivating fish there; or by the removal of their breeding places from the vicinity and by taking precautions against bite by providing mosquito nets while sleeping and applying essential oils over the exposed parts of the skin. Quinine is the standard remedy for malaria in all its forms. It kills the malaria parasites as soon as they enter the blood.

When malaria has been contracted, care of general health should be taken continually, and exposure to violent changes of temperature must be avoided. During the cold stage the patient should be packed round with hot-water bottles and have warm drinks. During the hot stage these warm drinks ought to be continued and care taken that he does not throw off the bed-cloth. If vomiting is troublesome, ice may be given to suck. In the sweating stage, the hot-water bottles may be removed.

Mania (*Junun*, *saudaa*, *malikholia*) is a form of insanity. It is characterised by an emotional state of elation and tremendous physical and mental activity, lack of coherence and irritability. A mental depression may follow. Mania attacks may last for days or months.

Measles (*Khasra*). It is an eruptive disease peculiar to children, slightly contagious but not dangerous. "Black" measles are dangerous.

It may commence with a slight chill or otherwise. The first symptoms are running of the nose, sorethroat, watering of the eyes and headaches. The rash appears on the fourth day, first coming on the neck and gradually appearing over the entire body. On the seventh or ninth day the symptoms subside. The incubation period for measles is about fourteen days, after which a rise in temperature and a coarse, dark-coloured eruption on the skin appears. The disease is conveyed directly from the sick to the healthy by contact or indirectly through a third person or infected clothes or toys. The infection is usually easily carried by the inhalation of the infected particles of dust or moisture. Unless proper precautions are taken all the children in the house are likely to fall in one after the other.

The patient should be isolated, clothes and bedding should be disinfected as also the room. The children of the house in which a case of measles has occurred should be kept under quarantine. The most infectious period is in the first four days before the rash appears. The child must be kept in bed away from all draughts and given aperient medicine and light diet. The first thing to be done by a doctor is to bring out the rash. When the eruption is out nothing but to keep the colon clean is needed by the washing down daily with tepid water. In all eruptive diseases guard against taking cold—for the cold closes all the pores of the skin shutting up Nature's vent through which she is expelling disease germs.

In itself measles is not serious, but unless care is taken, complications may follow. Those most to be feared are bronchitis (*halq ki sujan*), pneumonia, ear-ache or forms of the eye trouble.

Piles (*Bawaseer*) also known as hemorrhoids, are swelling which occur in the rectum and surround the anus. They are known as 'external piles', 'internal piles', or 'mixed piles', according as they occur under the skin outside the anus, under the mucous membrane within the opening, or on the margin, half covered by skin and half by mucous membrane. "Piles should be treated by warding off constipation by means of a well-chosen simple diet, including plenty of fruit, vegetables

and butter. Regular exercise should be taken. Piles must usually be removed only by surgical methods.

Plague. This disease is caused by *Bacillus Pestis*—plague germs—usually found in rats suffering from plague. The germs are transported into the human bodies through the agency of rat-fleas which feed on the blood or rats.

There are three chief varieties of plague: (*a*) Bubonic, (*b*) Septicaemic and (*c*) Pneumonic. In case of bubonic plague the germs attack the lymphatic glands. In case of septicaemic plague, the germs enter the blood directly. Pneumonic plague is carried directly through the air, independently of the agency of rat-fleas. In this case, the respiratory passage and lungs are mainly attacked, causing high fever, troublesome cough with attacked, blood-stained sputum (*thuk*) and pain in the chest.

The first sign of the spread of plague is an increased mortality among rats, because when the fleas are deprived of the blood of rats, they attack human beings for their blood. The disease is marked by high fever, severe headache, great prostration and swelling.

Preventive measures against the attack of the disease and against the spread of the epidemic consist in destroying rats by baiting and trapping them or by fumigating (smoking) their holes. The rat holes should be closed with a mixture of cement, and broken glasses. Houses should be rendered rat-proof. As soon as rats are found dying in a house or a locality, people should evacuate their houses and live in the open. The plague infected-house should be disinfected by cyllin, formalin or pesterlin and should be whitewashed before it is reoccupied. When there are signs of spread of the disease, people should get themselves inoculated by anti-plague vaccine.

Pneumonia. Pneumonia is an acute inflammation of the lungs (the organs of respiration (*phephre*), usually caused by a cold. The disease is sometimes called lung fever. The disease has been given this name because the whole of the lung in typical cases is affected. An infection involving a large portion of lung at a time is called *Lobar pneumonia* which is due to a germ called the *pneumococcus*. Certain complications

apart from heart failure are very frequent in this disease. The actual cause of death in the average pneumonia case is a failure of the heart, caused by the toxaemia and general strain to which the heart is subjected in this serious disease. *Broncho pneumonia* is a complication, of measles, whooping cough, influenza, etc. and is not very serious.

The disease begins quite suddenly like one of the infectious fevers. There is a rise in temperature to 103°F.

The first symptom is generally a fit of shivering, the face becomes flushed, the breathing is very quick and accompanied with pain. The whole lung is congested and little air reaches the affected globe or perhaps the whole side. The breathing becomes increasingly difficult until the cough begins; with this there is a little, scanty expectoration of a rusty colour. It is tinged with blood which becomes more copious as the cough increases. When children are suffering, convulsions may be amongst the early symptoms.

The patient must be kept at rest as completely as possible in a well-warmed room. Absolute quiet is necessary as sleep will conserve the strength. All causes of excitement or worry must be kept away from the patient. Hot bottles must be applied to the feet. See that the temperature of the room remains even. While the fever is at its height, sponge the head and body with warm water occasionally. This will help to soothe. At first the diet should consist of milk, strong soups, beef-tea and raw white of eggs, given at frequent intervals. The idea is to keep up the strength without overloading the stomach. Throughout the entire progress of this disease we must stimulate the patient so as to maintain the strength of the labouring heart but not to excess. The heart is performing its functions under great difficulty in pneumonia, and if we urge it on a little, we do well, but if we over-drive it, the heat will certainly give out.

Pneumonia is a very serious disease. A doctor must be sent for at once.

Poisoning. Poisons are of four kinds:

(*i*) Corrosive poisons. They produce intense agony

with swelling of the mouth and throat.

(*ii*) Irritant poisons. The symptoms are sickness, purging and abdominal pains.

(*iii*) Narcotic poisons. They do not give any pain, but induce giddiness, loss of sight, stupor and sleep ending in death with perhaps convulsions.

(*iv*) Narcotico-irritants are poisons of which the first symptoms are vomiting and purging of the irritants, though stupor and death follow.

The following general rules should be observed in all cases of poisoning:

(*a*) It is very important that the treatment should be given without delay.

(*b*) Empty the stomach.

(*c*) Stimulate the patient. Stomach should be emptied by giving a medicine that causes vomiting. By itching the back of the throat with a finger or with a feather or (*ii*) using mustard (*sarson, raai*) or salt, a table-spoonful in a tumbler full of luke-warm water. Thereafter give a right antidote to neutralize the poison which remains in the system. The antidote will vary with the nature of the poison.

If the poison is an acid, give chalk and water or whiting scraped from walls of ceiling in water, or white of egg. When poison is an alkali, such as potash, soda or ammonia, give vinegar and water or lemon juice. In case of a narcotic poison, make the patient walk about in the open air or in a room with windows wide open and administer the strongest possible coffee. Make the patient keep still; if possible, apply hot-water bottles, give stimulant such as strong coffee or brandy if there is any sign of collapse. In all cases of poison medical aid should be sent for without any loss of time.

Scurvy (*Kharish*). It is a disease of the blood. Scurvy is caused for the lack of fresh food, green vegetables and fresh meat. The symptoms are a dry, itchy condition of the skin, deep depression, deficiency of blood, and sometimes swelling and bleeding of gums.

Lime juice or lemon juice given liberally is the cure; often after a very few doses the improvement will be so marked as to seem miraculous. Cabbages, lettuce, potatoes, onions, mustard and grapes should be given freely.

Smallpox (*Chechak*). Smallpox is characterized by high fever, followed in about two days by the appearance of red pimples, at first on the forehead and wrists, and thereafter, spreading over the whole body. The red pimples then fill with water (vasicles) and then with matter (pustules). After some days the pustules ripen and burst. In confluent smallpox, the eruption runs together and the patient is in a condition of serious danger, especially on the third and ninth day. Then the scabs (a crust formed over a sore) begin to dry and fall off leaving the typical pits on the skin's surface.

The first symptoms of the disease are shivering, pain in the back, sickness, thirst and headache.

Preventive measures against this disease are:—

(*i*) Avoiding as far as possible a smallpox patient.

(*ii*) Vaccinating with cow-pox. A child should be vaccinated once within six months of the birth, and secondly, between 10 and 14 years of age, and

(*iii*) Inoculation with smallpox, *i.e.*, the disease itself.

With a disease so infectious it is imperative that a doctor should be sent for at once and immediate arrangements made for the isolation of the patient, in a hospital or under skilled nurses at home. The greatest care of the patient is necessary both during the acute illness and afterwards, throughout the convalescence. Abscess (*nasoor*), blindness, deafness and gangrene (*daad*) are amongst the after-effects to be warded off.

Sunstroke or Heatstroke. It is a brain trouble brought on by the exposure to the rays of the sun. The symptoms are headache, sickness, confusion of thought and inability to take food. In severe cases apoplexy (malady; *mirgi*, *sakta*) may follow. Some people are more liable to feel the effects of the sun than others. They ought to wear a binder round the body to protect the loins and see that the back of the neck is protected against direct rays.

The patient should lie down in a darkened room and be kept very quiet. Cold-water bandages or ice if it can be procured should be laid on the forehead.

Sun's part in sunstroke. The term 'sunstroke' has been largely replaced by "heatstroke" as a medical description. But Dr. M. L. Thomson, of the National Hospital of London, had suggested that sunstroke "tends to be the correct description". According to him ultraviolet radiation from the sun may be an outstanding factor in the illness by reducing the rate at which sweating, and therefore cooling takes place.

Typhus fever. It is a fatal kind of continuous fever. It is a terribly infectious fever which is often called the lice fever from the belief that the infection is carried by lice (singular louse, a parasite insect infesting human hair and skin: *jun*). This disease is found most frequently in places where people are gathered under insanitary conditions, in the slums of a congested town or with armies in the field under the old conditions.

The fever is marked by severe headache, chill, pain all over the body, much weakness, collection of dark-brown, foul matter over the lips. It often takes the form of coma (deep sleep). The rash is very characteristic, consisting of mulberry-coloured spots, which appear on the back and sides, but seldom on the face. The crisis takes place about the fourteenth day.

The preventive measures lie in the destruction of lice. The treatment consists in keeping the patient in a well-ventilated room, fresh air being of great importance. Ice or cold water bandages should be applied to the forehead. Diet must be liquid, *e.g.*, milk at first, later on the patient may be put on a simple, light food. The heart must be carefully watched. Stimulants will be necessary if there is great exhaustion.

Typhoid or **Enteric fever.** Enteric literally means pertaining to the bowels (*antarian*). The disease is probably so called because the bowels are relaxed in this disease. This fever is caused by a germ called *Bacillus Typhosus*. The germs are generally swallowed along with water, food or milk contaminated (infected) by either the stools, urine or saliva of typhoid patients. From the alimentary canal they enter the

blood where they liberate the characteristic toxin (a poisonous ptomaine). The chief seat of this terribly prevalent disease is in the stomach and intestines, particularly the colon. There the germs breed and multiply. Outbreak of this disease is usually due to the contamination of wells, springs, rivers and cisterns by the infected faecal matter and also by washing the clothes or utensils of the patient in these water supplies before proper disinfection.

The first symptoms are always very gradual. There is a general feeling of being out of sorts with a great deal of headache, loss of appetite and perhaps shivering fits. During the first fourteen days the patient suffers from ordinary diarrhoea and then the fever and disease set in. The urine becomes scanty, thirst increases and a rose-coloured eruption appears on the abdomen. The fever usually follows a regular pattern in its daily rise and fall and lasts a definite duration usually of three weeks.

Anti-typhoid inoculation is a successful precautionary measure. The protection afforded against typhoid lasts for at least two years but the resistance of the blood to the typhoid organism remains as high as four times the normal for a period of six years. Great care should be taken to prevent infection, which is spread through the excreta. All utensils used by the patient must be kept apart from other. One should not eat with a person suffering from this disease. Pure water or boiled water should be used.

The patient must be kept in bed and not allowed to sit up for any reason. No solid food must be given. This is of great importance as ulceration (formation into a dangerous sore) of the bowels will have set in and a solid food may cause perforation (the act of boring through a hole or into anything). Milk or barley water, as the doctor may order, should be given every two hours. The disease requires more of care than of medicines to cure. When convalescence (gradual recovery of health and strength) has been reached, the patient must be specially careful about his diet for a pretty long time after regaining perfect health. No solid food should be taken for some six weeks and thereafter, for a pretty long time, light diet should be taken.

Tuberculosis (T.B.) or **Consumption** (*Tap diq*) is a wasting disease, tubercular (*girah daar*) disease of the lungs. A *tubercle* is a small tuber or swelling, a pimple. Consumption means the act of using up or consuming—the converse of production. This is an infectious disease due to the germ *tubercle bacillus*, which invades the body and attacks the diseased tissues. The two most important strains of this bacillus—the human and bovine—are markedly different in their effect on children and adults, for whereas children are more susceptible to the attacks of the bovine, which causes non-pulmonary tuberculosis of the bones and joints, the adult is attacked by human form which causes tuberculosis of the lungs (phthisis). The infection is carried through the air, when it causes phthisis of the lungs or scrofula of the lymphatic glands of the neck, or it is carried through water and food when it assumes the form of tuberculosis of the alimentary canal. The lungs and the lymph glands are specially liable to infection, but the disease occurs also in the liver, intestine, spleen, kidney, bones, joints, pleura, brain etc. The disease lasts sometimes for years together.

Early symptoms of phthisis may include a slight persistent throat cough and a feeling of tiredness without evident reason, loss of weight and of appetite, indigestion and slight afternoon rise of temperature.

Preventive measures are that plenty of nourishing food should be eaten; a patient of tuberculosis should be isolated; general conditions of sanitation should be observed; persons with an inherited tendency to tuberculosis should not intermarry among persons of a similar constitution, etc.

At first a tuberculosis patient should necessarily be X-rayed to find out if the germs exist and then the sanitorium treatment should be adopted. The treatment should include plenty of eggs, milk, cream and fruit of all sorts. Soup made of mixed vegetables is spoken of very highly. Fresh air is of the first importance. The patient should be kept, as far as possible, out of doors, but chills must be avoided. Change of locality is very useful. B.C.G. vaccination, a recent treatment, is also very useful.

Vaccination is the inoculation of cow-pox lymph as a

guard against smallpox. Infant vaccination is believed to make a child immune from smallpox for seven years. At the end of that time the process should be repeated. Vaccination is also practised against plague, cholera, rabies, etc.

Whooping cough commences like a cold on the chest but the cough increases and tends to come in fits of acute pain occurring at intervals. Slight fever, running of the nose and swollen eyes are early symptoms, the whoop (a clear sharp cry) in cough is heard after a week or ten days. When it sets in, each paroxysm (*daurah*) of coughing ends with the sound. Sometimes an attack of vomiting is caused. This is also a fatal disease for children under five. The danger of this disease, if prolonged, lies especially in heart-disease or of wearing out of lungs, thus affording the child an easy prey to pneumonia or tuberculosis.

The cause of whooping are small germs. The infection is carried through the moisture exhaled in the coughing, and indirectly through clothes, toys, drinking cups, etc. This disease spreads among children very easily because they come together in school and at play.

As a precautionary measure against the disease, the patient should be isolated. All handkerchiefs and other linen used by the patient must be disinfected and washed separately. Domestic animals, *e.g.*, dogs, cats, etc. should be kept away, as they are susceptible to the disease and may convey the disease to other children in the street.

Chapter 15

SOME MEDICAL TERMS

Autojector is a machine which serves as an artificial heart and lungs. It has brought dead animals back to life for 15 minutes. The machine was made in 1943 by a group of Russian scientists under the leadership of Dr. Serge Bryukhonenko.

Antitoxin is the name applied to substances present in the blood of man and animals which neutralise the action of toxins or bacterial poisons.

B.C.G. Vaccine. B.C.G. vaccination is a recent effective treatment of tuberculosis. World Health Organisation (WHO) has been sending B.C.G. vaccination parties to various countries.

Chloroform is a limpid, mobile, colourless, volatile liquid, with a characteristic odour and strong sweetish taste used to induce insensibility.

DDT is a white powder which kills flies, mosquitoes, lice, etc. It is mixed with other materials. In order to kill flies and mosquitoes, it is sprayed at places where they usually gather. As DDT is a poison, it should neither be breathed into lungs nor be allowed to be sprayed over eatables or dishes.

Fasting is one of the quickest methods used for the elimination of poison from the body. It quickly clears out poisons and the person usually feels brighter and has more energy afterwards. Most of the religions of the world advocate fasting in one form or the other.

Gland. A gland is an organ of the body which has the power of secreting or taking up certain substances from the blood. The liver, which secretes bile, is the largest gland in the body.

Germicidin is a germ-killing substance. It is prepared

from soil bacteria and "used successfully in cases of impetigo boils, infected wounds, burns and various types of ulcers." It was in 1909 that Dr. Rene J. Dubos, of the Rockefeller Institute for Medical Research, first studied the substance.

Health is the normal condition of the body brought about by living in accordance with the Laws of Nature.

Inoculation is the communication of disease to a healthy subject by the introduction of a specific germ or animal poison into his system by puncture or otherwise.

Ice. In certain illnesses the doctors order the application of ice to the head or stomach or some other part of the patient's body.

Drinking iced water is not advised to those in health. Iced water is used to satisfy the thirst for the moment, but the thirst returns soon.

Muscles. The muscles are the lean or fleshy part of the body. Every movement of the body is made by the contraction or relaxation of these muscles. Those which move under the influence of the will are called voluntary muscles, *e.g.*, the muscles of the arms and legs; whilst those which carry on their work independently of the will are termed involuntary muscles, *e.g.*, the muscles of the heart, stomach, lungs, etc.

Stethoscope. It is an instrument with which to hear and gauge the action of heart.

Spinal cord is a nerve matter which passes from the brain down the centre of the spine. It sends out nerves in all directions.

Penicillin, a new (1942) drug, a substance that stops the growth of bacteria, was extracted from a mould *penicillium notatum*. It was discovered accidentally in St. Mary's Hospital, London (1928), when Dr. Alexander Fleming was examining some culture plates of staphylococci growing in a solution of agar. These cocci are one of many types which are responsible for various diseases including meningitis, pneumonia, septic wounds, carbuncles, tetanus, gonorrhea, diptheria and puerperal fever. Alexander Fleming noticed

that a green mould was growing on one of his culture plates. He examined this foreign mould. He noticed that the cocci in the region were either dead or apathetic. Alexander Fleming identified the mould (a minute fungus which grows on bodies in a damp atmosphere, so named from often growing on mould or soil) as *penicillium notatum*. Thereafter he extracted a solution from it which he called penicillin.

Great difficulties were experienced in producing a pure solution of penicillin in large quantities. Alexander Fleming's researches were for a time doomed to failure. However, in 1938, Professors Heilborn and Florey became interested in Fleming's original paper on penicillin. Later on they obtained the services of another brilliant scientist, Dr. N. G. Heatley. He discovered a new method of producing a pure solution of this wonderful drug, but he also failed to devise a method of producing penicillin in sufficient quantities. However, the difficulty was overcome jointly both by the American and the British people. Now it is available in large quantities.

For most diseases the solution is injected into the veins, but there is penicillin cream for the treatment of carbuncles, etc. There is also penicillin powder which is dusted on severe wounds and burns, and finally there is a lozenge for the treatment of mouth and throat infections. Penicillin can be used in conjunction with other anti-bacterial agents such as the sulphanomides, arsenicals or bismuth, or sometimes such a combined therapy as is advantageous.

Penicillin is the most powerful known anti-bacterial substance against staphyloccus, streptococcus, pneumococcus, meningococcus, and gonococcus, the organisms responsible for a very large proportion of infection encountered in everyday practice. Gonococcus is the most susceptible of all to penicillin. Trep pallidum is also sensitive. Commonly, conditions suitable for the treatment include the great majority of wound infection, pyogenic infections of the skin ; infections of the soft tissues ; infections of the nose, throat, nasal sinuses, respiratory tract, and middle ear, etc. Gonorrhea can be cured in a very short time. Generalised infections, Septicaemaia, and Pyaemia, from susceptible bacteria, are outstanding indications for

penicillin. Other conditions amenable to treatment include acute and chronic osteomyelitis, subacute bacterial endo-carditis syphilis, and meningits."

Some diseases in which penicillin has no beneficial effect are the various diseases—influenza, whooping cough, B. coli-infection, burcellosis and tuberculosis.

Mankind will always be grateful to the scientists who discovered the remarkable qualities of the mould which gave birth to the production of penicillin. Time alone will prove the value of this substance.

Toxin is a poisonous substance produced in human body by metabolic activities of certain micro-organisms. The poison is also of animal or vegetable origin. Some important toxins affecting man are those of dysentery, tetanus, diptheria.

Vaccination and injections. A preventive against the attack of bacteria of any disease has been made available through the immortal discovery of Dr. Jenner, that one attack of a disease leaves the body considerably immune (not liable to infection) from a subsequent attack of the same disease. Thus, a person who has had measles or smallpox, acquires immunity from the disease and his body is rendered stronger to resist a subsequent attack. This immunity can be acquired in much simpler way. Inoculate a less virulent type of the germs of the disease into the body of an individual. That will give a mild artificial attack of the disease and consequently will be safeguarded against that disease. The vaccine is prepared by sterilizing the fluid obtained from the blisters on the udders of cows or calves who are made to suffer from smallpox. The fluid is removed by pricking or incising the blisters before their incrustation takes place. Vaccination is done as a safeguard against smallpox.

The term vaccine has now come to have a broad meaning. It denotes all such prepared fluids as provide the immunity against a disease. These preparations are composed of great number of attentuated bacteria or a smaller number of more virulent ones, whose activity has been restrained by heat and use of suitable antiseptics. They are administered according to the age and strength of the individual. According to the

modern theory of their function, the vaccines pass into the blood and stimulate the healthy tissues in the body to form additional disease-resisting organisms, and thus check the harmful multiplication of the foreign bacteria.

Another method of rendering a person immune against attacks of disease, such as measles, pneumonia, diptheria, etc., is to inject into the blood the serum (the thin part of the blood) obtained from the blood of the animals who have been made immune against the particular disease. Increasing doses of the disease-germs of one particular disease are given to a horse, rabbit, sheep or goat till they are found to be proof against the disease. Some blood is then transfused from their veins and this provides the serum.

Chapter 16

FIRST AID

When someone is injured accidentally or is taken ill suddenly, there is usually some gap before the arrival of a doctor, during which it becomes essential to do something to save a life—to prevent a condition from getting worse—perhaps even to prevent unwise meddling. What is done at such a time is called *first aid*.

This term, therefore, refers to the immediate, temporary care given by a layman in case of an accident or sudden illness. When properly trained, such a man can make a careful examination of the injured person, take immediate action to prevent the condition of the person from getting worse (which may result in death), secure expert aid, provide for the comfort of the injured and when necessary arrange for his transportation to a doctor. His task is finished as soon as the doctor arrives; in other words, the entrance of the doctor is the exit of the layman.

Bleeding from the nose. To stop bleeding from the nose place the patient with head over the back of a chair and a wet sponge may be applied to the back of the nose. Cold-water cloth pieces should also be put on the nose and forehead.

Blood from a wound. When a person is losing blood from a wound caused by cutting, place a finger over the cut and after a few minutes, put on a plaster or bandage. In serious cases when the blood is bright red (that is arterial), pressure must be applied immediately between the wound and the heart to stop the supply of blood. This can best be done by applying a knotted handkerchief, twisted by means of a pocket so that the knot may press the proper place. In case the blood is dark-red, the pressure should be applied below the wound, away from the hearth, and the limb should be raised.

Broken limb. When a person gets his limb broken, as a temporary measure, the limb should be fixed, so that no movement takes place between the fractured ends. This you will best do by putting splints made of any stiff material along each side of the limb. They should be broader than the limb and long enough to pass beyond the joints above and below the fracture. They may be fixed by means of a handkerchief.

Burns by fire. In case of severe burns by fire the burnt parts must be covered up at once with strips of linen soaked in some non-irritating, antiseptic solution. Boric or picric acid gauze (a thin silk or linen) moistened in warm water may be applied. Some cotton-wool should then be bound on. Strong hot coffee or tea should be given.

Concussion (*laghzash*, *dhakka*, *chot*). A person who is found to be suffering from concussion (a violent shock caused by an accident), should be put to bed and wrapped in warm blankets. Hot-water bottles may be applied to the feet. Should consciousness lapse, medical help should be obtained.

Electric shock. In case you find a person in contact with live wire, switch off the current or pull out the plug to which the wire is attached. Care should be taken to avoid contact with live conductors. In case, however, it is not possible to cut off the current, an attempt should be made to pull the patient away from contact. Before attempting to remove a sufferer, see that you insulate yourself from the earth by having a rubber mat or some dry wood or pad of clothing under your feet, or failing that, pure silk gloves should be worn. If no such articles are at hand, use a dry wooden stick or a loop of rope or a woollen garment to pull the sufferer out of danger.

A doctor should be sent for at once. Lay him on his back, loosen his clothing, procure free circulation of air and place him in a reclining position. If no sign of breathing is observed place the body face downwards on a dry floor or on straw and at once proceed with artificial respiration as in case of an apparently drowned person. Do not delay for a moment. Continue as long as there is any hope of revival. In treating burns, if any, on no account should oil or grease be applied to the skin. The proper treatment consists in the burns being

dusted thickly with dry antiseptic powder, such as tannic acid or picric acid.

Emergency stretcher. Button up a man's coat and pass two broom sticks or walking sticks through the inside of the coat. As an alternative, small doors and gates may also be used.

Epilepsy (*Mirgi, sarah*). This is a chronic, functional disease of the nervous system, manifested by recurring attacks of sudden insensibility or impairment of one's consciousness, usually accompanied by peculiar convulsive seizures.

When a person is seized with an epileptic fit, all tight clothing should be removed from the neck and means taken to prevent the patient injuring his tongue by biting it. A cork or other similar article should be inserted between the teeth. The wrists and ankles should be secured to prevent the patient from knocking himself against furniture.

Sprain (*Marora; moch*). When a person severely sprains a joint, cold water should be allowed to run on the affected part for five minutes, three times a day. Bandages soaked in ice-cold water may be bound round the part. On the second day, cold-water treatment must cease and hot-water fomentation should commence. In all cases the limb must be bandaged firmly.

Foreign body in the Stomach. Pin or other small sharp objects may be accidentally swallowed. Give nothing by mouth but take the patient to a doctor at once. Smooth objects such as coirs or buttons need not cause alarm.

When a person's clothing catches fire, approach him holding a rug, blanket, coat or table-cover in front of yourself for protection. Wrap it round the patient, lay him flat and thus smother the flames.

If a person's clothing catches fire when alone, he should roll on the floor, smothering the flames with the nearest available warp and call for assistance. On no account should he rush into the open air.

Wounds. The treatment of wounds largely depends on their position and depth.

Generally speaking, first aid is concerned only with two issues:—

(*a*) the control of blood, which has already been dealt with under "Blood from a Wound", and

(*b*) prevention of sepsis or infection of wounds with dirt. It involves both cleaning the wound and the skin area around it, before applying a dressing, at the same time taking care not to contaminate the surface of the dressing at the time of application. If the wound is dirty it should be cleaned with water and soap. Care should be taken that dirty water does not get into the wound.

To prevent dirty lotion from getting down into the depth of the wound, clean the wound surface and gently dab it dry with bits of clean, sterilised wool. Having dried the surface, dip a piece of wool into the iodine and dab it gently over the raw surface. Then take a sterile lint or gauze, keeping your fingers away from the surface which is to be applied to the wound. Cover the surface with the lint or gauze—apply on the top of it a large piece of wool as a cushion—and bandage it firmly.

If the wound is in the abdomen, the chest, or the skull, do not attempt to clean the wound itself. In such cases apply a clean dressing over the wound, immediately clean the surrounding skin, put on a firm bandage and take the patient to hospital as quickly as possible.

EXAMINATION QUESTIONS

WITH SOLUTIONS

1. *Why do we get thirsty after exercise? Does a drink like lime-squash quench thirst more quickly than water?*

The proper function of the human body requires a free and ceaseless circulation of water. Human body is always losing water, through exhaling breath, perspiration etc. This loss of water by evaporation, or otherwise, helps the body do its work properly and also to maintain the temperature constant. During exercise all the parts of our body are exerted and comparatively a greater amount of water is lost in perspiration, etc. That is why we feel thirsty and require water. Further, after exercise we feel tired. In other words, the reserve of energy of fuel stored as food is diminished. If we take lime-squash, which contains in addition to water, lime-juice sugar in an easily assimilable form, both the needs of thirst and fatigue are satisfied. If we take simple water it is only the thirst that is quenched. The fatigue is still there.

2. *Why is it necessary to play games?*

During play, parts of the body which are not brought into use, and those which are often strained and tired, are allowed to rest. In games we use our limbs properly. They help us to sharpen our ideas and to act quickly.

3. *Why do we breathe more quickly when doing a vigorous exercise?*

During the period of vigorous exercise we breathe faster, because the tissues of the body are being used up more rapidly than under ordinary circumstances. Oxygen is required to change the tissues into such a form that they can be carried away by the blood. We breathe in the necessary supplies by increasing the ordinary rate of respiration.

4. *Why is warm food (but not hot) to be preferred as a rule to cold food?*

Warm food is more easily digested than cold food, because the digestive juices can penetrate the grains of food more easily than in the case of cold food. It also exerts tonic effect on the system, and stimulates the digestive organs into action.

5. *Why is it that meat and cereals are cooked when prepared for food?*

Meat and cereals consist of proteins, fats, starch, etc., which in the raw state are difficult of digestion. Therefore, by cooking we convert them into some other forms more digestible. By cooking, these substances get broken up into simpler ones. Secondly, the meat and cereals might contain substances harmful to the human body—for instance, meat may possibly contain organisms which cause various diseases. Similarly cereals, if old, may have on them the eggs of insects which, if carried into intestines, might cause complications. By cooking them various organisms are destroyed. Thirdly, meat and cereals in the raw state are not palatable or appetising. In order to make them tasty, they must be cooked. Things that taste well cause the mouth to produce juices which help digestion and hence simplify the working of the stomach.

6. *What simple rules should be observed so that the food we eat may benefit us to the fullest extent?*

(*i*) Meals should be taken at regular intervals. (*ii*) Food should be eaten slowly and masticated thoroughly. (*iii*) Very hot food is harmful. When cooled, it does not injure the delicate membranes of the mouth and throat. (*iv*) Overloading the stomach is the cause of much suffering and ill-health.

7. *Why is it necessary to have salt in an article of food?*

The complete withholding of common salt from our diet would lead to fatal result. Salt is a source of the hydrochloric acid of the gastric juice, without which digestion would be seriously impaired. Salt also helps in the solution of albumin and increases the flow of the saliva.

8. *Why are fruit and vegetables necessary as a part of our usual diet?*

Fresh vegetables and fruit contain valuable acids, minera salts and above all "vitamins" which are essential for growth and health. Sailors deprived of fresh vegetables and fruit suffer from scurvy.

9. *Why is it inadvisable to drink large quantities of liquid at meal time?*

If water or any other liquid be taken in large quantities, the digestive juices become diluted to such an extent that their work is seriously interfered with.

10. *Why is water an important article of consumption?*

The solid portions of our blood are dissolved in water. They then enter blood and feed the tissues of the body. Without a sufficient supply of water the health cannot properly be maintained.

11. *Why is it unsafe to drink rain-water which has not been filtered?*

Rain-water is frequently contaminated by impurities taken up from the surface on which it falls. Such impurities include decayed leaves, roots, feathers, etc. Lead and zinc may also be dissolved if the water passes along pipes or is collected from galvanized roofs. The only circumstances under which rain-water can be used with safety without being filtered are in the open country where the atmosphere is free from impurities, and where clean vessels are used to collect the water.

12. *What mineral impurity is often found in water? How is it removed?*

Carbonate of lime is frequently found as an impurity in water. It can readily be removed by boiling the water. In small quantities it does not have any injurious effect upon the system. But water is certainly better without it.

13. *What infectious diseases are often propagated by means of contaminated water?*

Two diseases—cholera and typhoid fever—are often spread by the use of contaminated drinking water. Water contaminated with sewage in which the germs of these diseases exist, has been proved to be a means of propagation of both these diseases; hence the importance of securing a supply of water free from contamination by sewage.

14. *How is water purified on a large scale?*

Water is first collected on a large scale in a large reservoir. The heavier impurities settle there. The water then passes

through filter beds consisting of sand and gravel. They remove the lighter impurities. The water then passes into the service reservoir ready for passing to the mains for use. In many modern systems the water is treated with chlorine to destroy organic matter; this enables ordinary river-water to be used for drinking purposes.

15. *Why is it important to form the habit of sitting correctly?*

By stooping forwards and lolling, people grow round-shouldered. Curvature of the body is induced by sitting with the body twisted. The proper way of sitting is that the body should be square, the head held erect and the shoulders kept well back. It produces good effects both moral and physical.

16. *In a human body how are the following caused:—*

(*a*) *Yawning* (*jamai lena*), (*b*) *Sneezing* (*chhiṇkna*), (*c*) *Coughing and* (*d*) *Beating of the Pulse?*

(*a*) When one feels drowsy or tired he involuntarily opens his mouth to inhale fresh air to refresh.

(*b*) Sneezing is a sudden, involuntary, violent and audible exhalation of breath through the nose. It is usually a reflex act brought on by irritation of the nasal branches of certain cranial nerves, which may arise from the presence of a foreign body from irritants, like the pollen of certain flowers, or from inflammation of the mucous membrane, are due to infection. A sneeze, when it is about to take place, can be effectively avoided by tightly pressing the upper lip against the teeth.

(*c*) Coughing is due to the abrupt opening of glottis to expel air from lungs with violent effort.

(*d*) Heart in its action as a pump sends a wave of blood along the tube and the tube being elastic bounds (leaps) with each wave of blood.

17. *Name some of the ill-effects which follow the breathing of impure air.*

Owing to an extended stay in ill-ventilated and crowded rooms, headaches, faintness, lassitude and giddiness result.

The oxygen in the red corpuscles of the blood is not fully renewed, and serious consequences follow.

18. *Why should we always keep our hands and finger nails clean?*

While eating, the hands are constantly brought into contact with our food. In case the hands are dirty, poisonous matter may be taken into our bodily system with the food. Therefore, hands should always be washed before a meal is taken and the finger nails should be kept clean.

19. *Why are flies harmful and what steps should be taken to prevent them from increasing?*

Flies only live where dirt is to be found. They carry about disease with them. Waste vegetables and other products should not be deposited in a heap near the house, but should be burnt. It is on such deposits that flies lay their eggs. Please see "DDT".

20. *Why is it that we cannot get asleep before long just after brain work?*

During brain work blood tissues of brain are active and it takes time to restore blood to normal circulation.

21. *Why mental work should not be done just after taking food?*

More blood is supplied by the nerves to the stomach after food to enable it to do work. A brain at work requires a flow of blood towards it. Mental work undertaken just after taking food tends to dislocate the natural flow of blood.

22. *How would you seek to restore animation to a drowning person?*

(*i*) Clear out the mouth in case any weed, etc., be in it; then roll the patient on the chest to allow any water to escape from his mouth. (*ii*) Place the patient on his back with shoulders raised and head slightly hanging back, loosen clothings, stand beyond head of the patient, take hold of the arms at the elbows and draw them gently upwards till they meet above the head. Keep this position for two seconds, then press them down firmly against the chest. Repeat these movements about fifteen times a minute till breath returns, or the doctor pronounces life extinct.

23. *What would you do in case of a snake-bite?*

Send for a doctor, tie bandages on both sides of the wound, cut it open and apply solid permanganate of potash.

24. *What would you do if you find a man unconscious in contact with a live electric wire wearing nothing but a loin cloth?*

Cloth is a non-conductor. Catch hold of him by the loin cloth and pull him off the electric wire.

25. *What is meant by disease?*

The word "disease" literally means *dis-ease* "apart from ease" and signifies that one or more of the organs of the body cannot carry on their work properly.

26. *Name three infectious and three contagious diseases.*

Infectious—influenza, typhus fever, whooping cough.

Contagious—smallpox, leprosy, scarlet fever.

27. *A healthy person contracts enteric fever through drinking impure water and recovers after suitable treatment. Describe what has (a) caused the illness (b) effected the recovery.*

28. *How did malaria and influenza get their names.*

Malaria and influenza are relics of discarded theories of their origin. Malaria was considered to be caused by *male aria*, "bad air" and influenza by the influence of planets.

29. *What parts of the body are primarily affected by the following diseases:—*

(i) Pneumonia, (ii) Nephritis, (iii) Jaundice (iv) Paralysis, (v) Mumps?

(*i*) Lungs, (*ii*) kidneys, (*iii*) skin, (*iv*) nerves, (*v*) glands under the ear.

30. *Where should opening for the exit of foul air in a room be placed and why?*

Foul air from the lungs is warm and, therefore, light. It rises to the ceiling. Therefore, openings for the outlet of bad air should be placed near the ceiling or in the ceiling.

31. *How is it that:*

(*a*) *A healthy human body is always warm?*

(*b*) *The normal temperature is maintained under very widely varying climatic conditions in the case of* (*i*) *a healthy man* (*ii*) *a horse, a dog and* (*ii*) *a bird?*

(*a*) When a healthy man breathes, air containing oxygen enters his lungs and oxides the blood and generates heat.

(*b*) Heat is being constantly distributed throughout the body. It is subject to incessant regulation. Blood, when its temperature has been raised by oxidation, rapidly moves into other regions of the body and there it gives up its increased temperature to them. Blood which is carried to the vessels of the skin on the surface of the body loses heat by evaporation, radiation, and conduction. It is hurried away into deeper organs before it has time to get thoroughly cooled. The circulation thus continues. It will be seen that circulation of blood is caused almost in the same way as movements in the air are caused.

The regulation of temperature is further helped by sweat-glands under the skin. As soon as the temperature rises, these glands automatically begin to give out sweat which on being evaporated lowers the temperature of the body, but when the surrounding temperature is cool, the pores of the skin contract and, practically speaking, no evaporation takes place. The body can thus lose heat only by radiation and by water vapour carried in the breath. In this way the normal temperature is maintained in the case of a healthy man, a horse or a bird.

In the case of a dog, the conditions are different. Dog has no sweat-glands except under the pads of the feet. Therefore, instead of sweating it has to pant for removing as much water vapour as possible through the breath to reduce the temperature.

32. *It is better to breathe through the nostrils rather than through the mouth. Justify the statement.*

Particles of dust are held up in the nasal passage and the air is warmed. Those who breathe through mouth,

constantly suffer from throat and lung troubles, because they breathe in cold air and particles of dust.

33. *What is the normal temperature of human body?*

34. *Why is it that we feel cold when our health is not good?*

In an unhealthy body the blood circulates less freely. There is not sufficient oxygen carried through the body to perform the work of burning or oxidizing the waste tissues of the body. Consequently, combustion is retarded and we feel cold.

35. *Why is it that we feel refreshed after a night's sleep?*

During sleep, tissues are wasted less than when the body is active. The waste products are removed and the building up of tissues goes on during sleep. Thus the bodily energy is increased. Bed-rooms should be well-ventilated so that the blood may carry sufficient oxygen to the tissues without unnecessary fatigue to the muscles connected with the lungs of the heart.

36. *Why is it dangerous to push any small article into the ear?*

The membrane of the drum of the ear is quite thin and may be perforated when an article is pushed into it. If once broken, it cannot be repaired and deafness follows. A hard blow on the ear may also cause similar result.

37. *What are the common practices which are liable to injure teeth?*

(*i*) Eating very hot or very cold things damages the enamel on the teeth. (*ii*) Cracking nuts or opening pocket knives with the teeth, or prickling the teeth with pins and needles, breaks the enamel and then decay sets in and severe pain follows.

38. *What do you understand by the following:—*

(*i*) *A sedative*, (*ii*) *An antiseptic*, (*iii*) *Anaesthetic* (*iv*) *A febrifuge*, (*v*) *Narcotic*, (*vi*) *Nicotine*, (*vii*) *Prophylactic?*

(*i*) A medicine which soothes and lessens pain.

(*ii*) An agent counteracting putrefaction (attack by injurious germs). (*iii*) An agent that produces insensibility. (*iv*) A medicine which reduces fever. (*v*) A substance inducing drowsiness, sleep, stupor or insensibility. (*vi*) Poisonous alkaloid extracted as oily liquid from tobacco. (*vii*) Medicine or measure tending to prevent attack of disease.

39. *What parts of the body are mainly affected by the following diseases:—*

(*i*) *Pyorrhoea*, (*ii*) *Mumps*, (*iii*) *Hepatitis*, (*iv*) *Opthalmia*,

(*v*) *Eczema*, (*vi*) *Arthritis?*

(*i*) Teeth, (*ii*) Salivary glands, (*iii*) Liver, (*iv*) Eyes, (*v*) Skin, (*vi*) Joint.

40. *What precautions will you take against the possible future attacks of:—*

(*i*) *Cholera*, (*ii*) *Plague*, (*iii*) *Smallpox*, (*iv*) *Caries*, (*v*) *Enteric Typhoid fever*, (*vi*) *Dengue Fever?*

(*i*) Take fresh fruit and clean vegetables, (*ii*) get inoculated and avoid living in places where there are rats, (*iii*) get vaccinated, (*iv*) eat less of sugar and more of fruit (*v*) filtered water should be taken, (*vi*) mosquito net should be used.

41. *What should be done to lessen the pain when a person gets a joint severely sprained?*

42. *In case of severe burns by fire what should be done at once?*

43. *A person is found to have taken poison. What action will you take?*

44. *What will you do to stop bleeding from the nose?*

45. *How will you stop bleeding from a wound?*

46. *Explain how would you readily devise on emergency stretcher in case of an accident?*

47. *How do you find the temperature of a person? What is the normal temperature? What is the high fever temperature?*

48. *What is health?*

49. *What is a disease?*

50. *What are the causes of diseases?*

51. *What do you know about penicillin?*

52. *Explain the action of a medicine dropper.*

53. *Why are flies dangerous in a house?*

54. *What do you understand by:—*

(*a*) *Blood pressure,* (*b*) *high blood pressure?*

55. *How are the following diseases caused, and how can they be cured: Diabetes, pernicious anaemia, beriberi, rickets?*

56. *Explain what is meant by the following terms:—*

(1) *Epidemic,* (2) *digestion,* (3) *sanitation,* (4) *inoculation,* (5) *sterile?*

57. *Your servant is suddenly taken ill with one of these diseases and no medical help is available. How would you diagnose and treat him:*

(*a*) *Cholera,* (*b*) *malaria,* (*c*) *pneumonia,* (*d*) *appendicitis?*

58. *Which insects spread:—*(*a*) *Bubonic plague,* (*b*) *malaria,* (*c*) *sleeping sickness,* (*d*) *cholera,* (*e*) *kala azar.*

59. *Describe the chief symptoms, and briefly indicate the treatment of any two of the following diseases:—*

(*i*) *Malaria,* (*ii*) *bubonic plague,* (*iii*) *typhoid fever,* (*iv*) *chicken-pox.*

60. *How are the following diseases spread:*
Malaria, cholera, smallpox?

For answers to questions Nos. 41 to 60 please consult the chapter.

CHAPTER 16

SCIENTISTS, THEIR INVENTIONS AND DISCOVERIES

Scientists	*Inventions and Discoveries*
Ampere, Andre Marie	Electric Dynamo.
Archimedes	Principle of lever and specific gravity, Archimedean Screw.
Arkwright, R.	Spinning-frame.
Bacon, Roger	Gun-powder, air-pump, magnifying glass and spectacles.
Baird, John Logie	Television.
Bell, A. Graham	Telephone and Photophone.
Berliner, E.	Gramophone.
Brennan, Louis	Gyroscope Railway.
Bunsen, Robert Wilhelm	Bunsen's Burner.
Cartwright, E.	Power-looms and Wool-combing Machine.
Caxton, W.	Introduced Printing in England.
Colt, Samuel	Revolver.
Curie, Madame / *Curie, Prof. Pierre*	Radium.
Dalton, John	Propounded Atomic Theory.
Darwin C. R. (*Charles Robert*)	Miner's Safety Lamp.
Diesel, Rudolf	First successful internal combustion engine.
Dunlop	Pneumatic Tyre.
Eastman, George	Kodak Camera, the Roll Photographic film.
Edison, T. A. (*Thomas Alva*)	First electric incandescent lamp phonograph, motion pictures, patented over 1300 inventions.
Einstein, Albert	Theory of Relativity.
Ericsson, John	Screw Propeller.
Fahrenheit G. D.	Mercury Thermometer.

Scientists	*Inventions and Discoveries*
Fleming Sir Alexander	Penicillin.
Fulton, Robert	First successful steamboat.
Gatling, Richard J.	Machine-gun.
Hertz, Heinrich	Wireless.
Howe, Elias	Sewing Machine.
Janssen, Z.	Microscope.
Jenner, E.	Vaccination for small pox.
Kepler, J.	Laws of planetary motion.
Langley, S. P. (Samuel Pierpoint)	Aeroplane.
Macadam, John Singor London	Metalled roads.
Marconi	Wireless Telegraphy.
Mcormick	Reaping Machine.
Montgolfier	Hot-air Balloon.
Morse, S. F. B.	Morse code, Morse system of electric telegraph.
Napier, John	Logarithms.
Newton, Sir Isaac	Laws of Gravitation.
Nobel, Dr. Alfred Bernhard	Dynamite.
Parsons, Sir C. A.	Steam Turbine.
Pasteur, Louis	Rabies preventive (Pasteur Institute).
Pascal, Blaise	Calculating Machine.
Pitman, Sir Isaac	Phonographic Shorthand.
Rontgen, W. K.	X-rays (Rontgen Rays).
Simpson, James	Chloroform.
Sperry	Gyrocompass.
Stephenson, George	Railway.
Tonnicelli	Barometer, improved microscope and telescope.
Volta, A. C.	Voltaic Cell.
Watt, James	Locomotive.
Wheatstone, Sir Charles	Stereoscope.
Westinghouse, George	Compressed Air Brake.
Whitehead, Robert	Torpedo.
Yersin, Alexander	Anti-plague Serum.
Zeppelin, Count	Zeppelin Plane.

CHAPTER 17

INVENTIONS AND DISCOVERIES

Inventions and Discoveries	*Scientists.*	*Year*
Adding-Machine	Pascal, Blaise, (1623—1662)	1642
Addressograph	Duncan, J. S.	1893
Aeroplane	Langley S. P. Orville Wilbur Wright	1903
Air Brake (Compressed)	Westinghouse, George	
Are Lanp	C. F. Brush	1879
Atomic Theory	Dalton, John	1883
Autogiro	Juanrdela Cierva (1896—1936)	1920
Balloon	Jacques (1745—99) Joseph Montgolfire (1740—1810)	1783
Ball-Point Pen	John J. Loud	1888
Barbed Wire	Glidden, Joseph F.	1873
Barometer	Tonnicelli, Evangelista	1643
Bicycle	Macmillan, Kirkpatrick (1810—78)	1839
Bicycle Tyres (pneumatic)	Dunlop, John Boyd (1840—1921)	1888
Bifocal Lens	Benjammi Franklin (1706—90)	1780
Boring Machine	Wilkinson	1774
Bunsen's Burner	Robert Willhelm Von Bunsen (1811—99)	1855
Calotype	H Fox Talbot	1840
Calculating Machine	See Adding Machine	
Cannon (iron)	Germany	1320
Car (steam)	Cugnot, Nicolas (1726—1804)	1769
Car (petrol)	Karl Benz (1844—1929)	1885
Carburettor	Gottlieb Daimler (1834—1900)	1876

Celluloid	Parkes, Alexander (1813—90)	1865
Cement	Aspodin, Joseph	1824
Chloroform	Simpson, Sir James	..
Chronometer	Harrison, John (1693—1776)	1735
Cinematograph	Edison, Sir Thomas	..
Clock (*mechanical*)	Hsing and Liang Ling-Tsan (China)	725
Clock (*pendulum*)	Huygens, Christian (1629—95)	1657
Dental Plate	Plantson, Anthony A. (1774—1837)	1817
(*Rubber*)	Goodyear, Charles (1845—1921)	1855
Diesel Engine	Diesel, Rudolf (1858—1913)	1895
Disc Brake	Lanchester, Dr. F.	1902
Dynamite	Noble, Dr. Alfred Bernhard	1868
Dynamo	Farrady	1831
	Picinotti	1860
Electric Furnace	Siemens	1861
Electric Lamp	Thomas Alva Edison	1879
	John Wilson Swan	1878
Electric Motor (*D. C.*)	Zenobe Gramme (1826—1901)	1873
Electric Motor (*A. C.*)	Nicola Tesla (1856—1943)	1888
Electromagnet	William Strugeon	1824
Electric Computor	J. G. Brainred, J. P. Eckert, J.W. Muchly	1942
Evolution (*Theory*)	Darwin, C. R.	..
Film (*musical*)	Dr. Lee de Forest	1923
Film (*talking*)	Warner Bros.	1926
Fountain Pen	Waterman, Lewis E. (1837—1901)	1884
Gas Engine	Otto, Nikolas August	1876
Gas Lighting	Murdock, William (1754—1839)	1792
Glass (*stained*)	Augsberg (Germany) about	1080
Glassware	Egypt and Mesopotamia about	1500 B.C.
Glider	Cayley, Sir George (1773—1857)	1853

Gramophone	Berliner E. Thomas Alva Edison (1847—1931)	1878
Gravitation Laws	Newton, Sir Isaac	1657
Gun	Armstrong, Lord	1855
Gun (automatic)	Maxim, Sir Hiran Stevens	..
Gun-powder	Bacon Roger	about 1245
Gyro-compass	Sperry, Elmer A.	1911
Helium	Ramsay, Sir William	1895
Homeopathy	Hahnemann, Samuel, C. F.	..
Hydraulic Crane	Armstrong, Lord	..
Hydrogen	Cavendish	1766
Hydophobia (Antitoxin)	Pasteur, Louis	..
Hydroplane (Seaplane)	Gurtiss, Glen Hammond	1911
Intelligence Tests	Binet	1905
Jet Engine	Whittle, Sir Frank (b. 1906)	1937
Jet Propulsion	Whittle, Sir Frank	1895
Kodak Camera	Eastman, George	..
Lactometer	Discas	..
Laser (Abbreviation for Light amplification by stimulated emission of radiation)	Dr. Charles H. Townes	1960
Lathe	Greeks for wood-working	about 1500 B.C.
Laws of Gravitation	Newton, Sir Issac	..
Lifeboat	Lionel Lukin	1785
Lightning Condutor	Franklin, Benjamin	..
Lightning	Franklin, Benjamin (1706—90)	1752
Lithography	Senefelder, Alois	1799
Locomotive	Richard Trevitheck (1771—1833)	1804
Logarithms	Napier, John	1614
Loom, power	Cartwright, Edmund (1743—1823)	1785
Loudspeaker	Rice-Kellogg	1924
Machine Gun	Richard Gatling (1818—1903)	1861
Magic Lantern	Kircher	17th cen.

Maps	Sumerians (clay tablets)	about 2500 B.C.
Margarine	Hippolyte Mege-Mouries	1863
Match, Safety	Lundstrem, J. E.	1855
Maxim Gun	Maxim, Sir Hiram Stevens	1831
Metalled Road	Macadam, John Loudon	19th cen.
Microphone	Bell, Alexander Graham (1847—1922)	1876
Microscope	Janssen, Zacharias	1590
Microscope (*electron*)	Vladimir Kosme Zwerykin	1939
Micrometer	William Gascoigne	17th cen.
Microscope	Janssen, and improved by Galileo, Fontana, etc.	1590
Milking Machine	Robert Kennedy & Lawrence	..
Mirror (*silver*)	Praxiteles	B.C. 328
Morse Code	Morse, Samuel Finlay Breese	..
Motor Cycle	Butler Edward	1884
Motor Scooter	Greville Bradshaw	1919
Moving Pictures Machine	Edison, Thomas	..
Neon Lamp	George Claude (1871—1960)	1915
Nylon (*First stock made about* 1937, Yarn *Production Dec.* 1939).	Dr. Wallace H. Carothers	1937
Oil Engine	See Diesel Engine	
Oxygen	Priestley Joseph	1774
Paper (*Introduced to West via Samarkand about* 750)	China	about 150
Parachute	Andre-Jacques Garnerin (1769—1823)	1797
Parchment	Egypt	about 1300
Parking Meter	Magec, Carlton C.	1935
Penicillin	Fleming, Sir Alexander	1928
Phonographic Shorthand	Pitman, Sir Isaac Alva	1837
Photophone	Bell, Alexander Graham	
Photography (*on metal*)	J. Nicephore Niepce (1765—1833)	1826
Photography (*on paper*)	Talbot, W.H. Fox (1807—77)	1835

Photography (on films)	Carbutt, John	1888
Pistol (Revolver)	Colt	1835
Plague Bacillus	Yersin and Kitasato	1894
Pneumatic Tyre	Dunlop	1887
Potter's Wheel	Asia Minor	about 6500 B.C.
Printing Press	Gutenberg, Johan Zu (1400—68)	1440
	Caxton, William	
Printing (rotary)	Richard Hoe	1846
Propeller (ship)	Francis Smith	1837
Radar	Tylor, Dr. Albert H. and Leo C. Young.	1922
	Sir Robert Watson Watt	1935
Radio Telegraphy (over 1 km.)	Rutherford, Lord (1871—1937)	1895
Radio Telegraphy (transatlantic)	Marconi, Guglielmo (1874—1919)	1901
Radiometer	Crookes, Sir William	1876
Radium	Madame Curie & Prof. Pierre Curie	..
Railway	Stephenson, George	1825
Rayon	American Viscose Co. of Pennsylvania	1910
Razor (electric)	Schick, Col. Jacob	1931
Razor (safety) (First threw away blades, then fixed safety by Kampfe)	Gillette, King C.	1895
Reaper	Ogle, Henry	1826
Reaping Machine	Mcormick	1831
Record (long plying)	Dr. Peter Goldmark	1948
Refrigerator	Harrison, James	1851
Revolver	Colt, Samuel (1814—62)	1835
Rocket	Congreve, Sir William	19th cen.
Rubber (latex foam)	Dunlop Rubber Co.	1928
Rubber (tyres)	Thomas Hancock (1786—1865)	1847
Rubber (vulcanized)	Goodyear, Charles (1800—60)	1841
Rubber (waterproof)	Macintosh, Charles (1766—1843)	1819

Safety Lamp	Davy, Sir Humphrey	1815
Safety Lock	Bramah, Joseph	
Safety Pin	William Hunt	1849
Self-starter	Kettering, Charles F. (1876—1958)	1911
Sewing Machine (Earliest practical domestic machine by Isaac M. Singer)	Thimmonnier, Barthelemy (1793—1854)	1830
Ship (*sea-going*)	Egyptian ships	about 2500 B.C.
Ship (*steam*)	Perier. J. C. (1742—1818)	1775
Ship (*turbine*)	Parsons, Hon. Sir Charles	1894
Silent Radio	C.M.R. Balbi	..
Silk manufacture	China (Reeling machines devised)	about 50 B.C.
Skyscaper	Jenny, William Le Baron	1882
Spectacles	Italy	about 1286
Spinning Frame	Arkwright, Sir Richard (1732—92)	1769
Spinning Jenny	Hargreaves, James	1764
Spinning Wheel	Crompton, Samuel	1779
Steam Engine	Savery, Thomas (1650—1715)	1698
Steam Hammer	James Nasmyth	..
Steam Engine (*piston*)	Newcomen, Thomas (1663—1729)	1712
Steam Engine (*condenser*)	Watt, James (1736—1819)	1765
Steamer	Fulton, Robert	1807
Steam Hammer	James Nasmyth	..
Steam Turbine	Parsons, Sir Charles Algernon	..
Stenography	Sir Isaac Pitman	..
Stereoscope	Wheatstone, Sir Charles	..
Stethoscope	Laennec	1816
Stirrups (*metal*)	Avars	about 550
Steel Production	Bessemer, Henry (1813—1898)	1885
Steel (*stainless*)	Henry Brearley	1913
Submarine	Fulton, Robert	1801
Tank (*military*)	Swinton, Sir Ernest (1868—1951)	1914
Telegraph Code	Morse, Samuel F. B. (1791—1872)	1837

Telephone (Scientific toy at Frankfurt-am-Main)	J. Philip Reis (1834—74)	1861
Telephone (First exchange at Boston)	Bell, Alexander Graham (1874—1922)	1876
Telegraphy (Wireless)	Marconi, Signor	..
Telescope	John Lippershey	1608
Telescope	Galileo, Galilei	1610
Telescope, Reflecting	Newton	..
Television	Baired, John Logie (1888—1946)	1926
Thermometer	Gelileo Galilei (1564—1642)	1593
	Fahrenheit	1621
Torpedo	Whitehead, Robert	..
Tractor (petrol-engined)	Froclich, John	1892
Tractor (caterpillar)	Benjamin Holt	1900
Tramway	John Francis (American)	1858
Transformer	Stanley, William	1885
Transistor	John Bardeen, William Shockley and Walter, Britain	1948
Tram (railed)	Railed mining tracks	1550
Tram (electric)	Siemen, E. Werner Von	1879
Truth Serum	Leonard Keeler	..
Tuberculosis Bacillus	Koch, Robert	1882
Typewriter	Mitterhoffer	1864
Vaccination (smallpox)	Dr. Jenner, Edward	1796
Washing machine (electric)	Hurley Machine C.	1907
Watch (self-winding)	Breguet, Abraham Louis	1791
Welder (electric)	Elisha Thomson (1853—1937)	1877
Wheel	Sumerian civilization about	3300 B.C.
Windmill	Persian corn grinding mills about	600
Wireless	Hertz, Heinrich	1888
Wireless Telegraphy	Marconi, Signor	1196
Wireless Waves	Maxwell, James Clerk	1864
Wool-combing Machine	Cartwright, E.	..
Writing	Sumerian civilization about	3400 B.C.
Xerography	Chester Carlson	1937
X-Rays (Rontgen Rays)	Rontgen, Professor Wilhelm Konrad	1895
Zeppelin	Zeppelin, Count	..

EXAMINATION QUESTIONS

WITH BRIEF SOLUTIONS

1. *What scientific inventions and discoveries are associated with the following persons?*

(1) *Priestley*, (2) *Dalton*, (3) *Gay-Lussac*, (4) *Harvey;* (5) *Leeuwonhock*, (6) *Laennec*, (7) *Lister, Lord*, (8) *Binet*, (9) *Fleming*, (10) *Thomson, Sir Joseph John*, (11) *Einstein*, (12) *Rutherford*, (13) *Chadwick*, (14) *Hahn*, (15) *Franklin*, (16) *Volta*, (17) *Ohm*, (18) *Morse*, (19) *Steinmetz*, (20) *Diesel*, (21) *De Forest*.

1. Discovery of Oxygen. 2. Atomic theory, laws of chemical combination. 3. Laws of gases. 4. Circulation of blood and function of the heart. Observation of bacteria by microscope. 6. Invention of stethoscope, 7. Antiseptic surgery. 8. Intelligence tests. 9. Penicillin. 10. Discovery of electrons. 11. Special theory of relativity. 12. Theory of atomic nucleus. 13. Discovery of neutron. 14. Discovery of uranium fission. 15. Lightning conductor. 16. Voltaic cell. 17. Laws of electrical resistance. 18. Electric telegraph perfected. 19. Laws of alternating current in electricity. 20. First successful heavy engine. 21. First to use alternating current transmission.

2. (*a*) *Who invented Wireless Telegraphy?* (*b*) *Who Introduced the Theory of Relativity?*

(*a*) *Marconi* (*b*) *Einstein.*

3. (*a*) *Who invented printing?* (*b*) *Who invented the steam-engine?* (*c*) *Who invented the railway?* (*d*) *Who introduced vaccination?*

(*a*) Gutenberg. (*b*) James Watt. (*c*) Stephenson. (*d*) Dr. Jenner.

4. *Who invented the phonograph and to which country did he belong?*

Thomas Alva Edison, an American.

5. *With what sciences do you connect the following names:—*

(*a*) *Bragg*, (*b*) *Taylor*, (*c*) *Hooker*, (*d*) *Poincare*, (*e*) *Pascal*, (*f*) *Marshall?*

(*a*) Physics, (*b*) Mathematics, (*c*) Botany, (*d*) Physics, (*e*) Mathematics and Pneumatics, (*f*) Surgery.

6. *Which famous names do you connect with the following discoveries? One name in each case will suffice:*

(*a*) *Printing Press,* (*b*) *Steam Locomotive,* (*c*) *Telegraphy,* (*d*) *Wireless,* (*e*) *Flying.*

7. *With what branches of discovery do you connect the following:*

(*a*) *Curie,* (*b*) *Roman,* (*c*) *Rontgen,* (*d*) *Radium?*

8. *Who discovered* (*a*) *X-ray,* (*b*) *Radium?*

9. *With what type of scientific development do you associate the following names:* (1) *Stevenson,* (2) *Marconi,* (3) *the Wright Brothers,* (4) *Cartwright,* (5) *Pasteur?*

10. *Who discovered* (*a*) *the Laws of Gravitation,* (*b*) *Gunpowder,* (*c*) *the Safety Lamp?*

11. *Why are the following famous:* (*a*) *Charles Darwin,* (*b*) *Thomas Edison,* (*c*) *Alexander Fleming,* (*d*) *Ross,* (*e*) *Jenner,* (*f*) *Harvey,* (*g*) *Diesel?*

For answers to questions from No. 6 to 11 please consult the chapter.

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PART III

WORLD GEOGRAPHY

CHAPTER I

PHYSICAL GEOGRAPHY

Geography. *Geo* means the earth; *graph* is a representation by means of lines, exhibiting the nature of the law according to which some phenomena vary. Geography is, therefore, a description of the earth. It is a science which describes the surface of the earth and its inhabitants.

How the earth came into existence has already been discussed in the chapter on "General Astronomy". Now we shall deal with what we find on its surface.

Rocks. In quarries, in new railway cuttings, or along the seashore, you may have, perhaps, noticed that the ground is formed of one or the other of the following materials: sand gravel, clay, chalk, sandstone, limestone. You know too that coal and the ores of iron and other metals are dug from the ground. In Geology and Geography such substances as these, whether hard like stone or soft like sand which form part of the crust of the earth, are called *rocks*. Some rocks such as sand are formed of loose grains, others, such as chalk and coal, are compact but are easily broken up, others again, such as granite, are very difficult to break.

At first there was perhaps a hot molten matter (lava). In some cases it cooled and solidified on the outside surface of the earth, while in other cases it cooled and solidified at some depth below the surface of the earth. There was no human eye to see this process. Such rocks are known as *igneous rocks*. They are found in mass and not in layers. So they are called *unstratified rocks*.

The earth is tens of millions of years old, and throughout this vast period of time rocks have been worn away through atmospheric changes and the waste from them carried seawards by running water. Thus, enormous beds of rock waste continued to be laid down on the bottom of the sea, layer upon layer and the underneath layers became hardened and dried

to form new rocks. As these rocks are formed of waste of old rocks which settled down as sediments under waste, they are called *sedimentary rocks.* Limestone, sandstone, chalk etc., were formed in this way. Owing to changes on the surface of the earth these rocks found their way above the surface of water. As these rocks are found in layers (strata) they are also called *stratified rocks*.

World's Important High Mountains

Name	*Range*	*Height (feet)*
Everest	Himalayas	29,141
Godwin Austin (K2)	,,	28,250
Kanchanjunga	,,	28,146
Makalu	Nepal-Tibet	27,824
Dhaulagari	Nepal	26,811
Nanga Parbat	N. W. Kashmir	26,629
Nanda Devi	Tibet (near India)	25,645
Kamet	India-Tibet	25,447
Minya Konka	Sinkiang (China) USSR.	24,900
Communist Peak	USSR	24,590
Sahama	Andes	21,480
Mount Logan	Rockies	19,539
Mount Elias	,,	19,500
Kilimanjaro	E. Africa	19,326
Elburs	Caucasus	18,464
Popocatepetl	Mexico	17,785
Ararat	Armenia	16,916
Mount Blanc	Alps	15,782

Famous Mountains Passes

Pass	*Location*	*Altitude (feet)*
Alpine	Colorado	13,550
Bolan	West Pakistan	5,880
Brenner	Austrian Alps	4,588
Khyber	Afghanistan	3,872
St. Bernard	Swiss Alps	8,100
St. Gothard	,,	6,936
Simplon	,,	6,595

Changes on the surface of the Earth. It is a fact that the surface of the earth has throughout its history been subject to changes which are taking place even today. In the beginning, when the earth was extremely hot, these changes were sudden and violent. But now when the surface has gradually cooled, these changes are so slow and gradual that they are scarcely perceptible. The Isles of Japan are slowly rising, while the coast of South Sweden and East England are sinking. During the last one thousand years some inland towns in the east of England have become ports. There was a time when an ocean rolled where the Himalayas erect their lofty heads now, and Australia was at one time joined to Asia.

But how are these changes brought about? There are forces such as contraction of the earth, volcanic action, earthquakes, which have their origin in the interior of the earth and bring about changes on the surface. And there are forces, such as water, air, winds, temperature, etc., which work above the surface of the earth and bring about changes there.

Contraction of the Earth. The interior of the earth is very hot and is gradually cooling. As it cools, it contracts and occupies less space. This causes wrinkles or folds on the crust of the earth. Consequently, some portions of its surface rise and some sink slowly. The elevated portions make mountains and plateaus, while the sunken portions became valleys and seas or oceans. In case the rocks are too hard to fold on cooling, they break forming cracks (technically called as faults).

Temperature also plays a great part in bringing about changes on the surface of the earth. During the day rocks are heated, and they expand. At night they get cool. By alternate expansion and contraction the rocks break up. In deserts and dry regions this action is very conspicuous on account of the extremes of temperature. Thus rocks are broken up into sand.

Glaciers are slow-moving rivers of ice. When snow falls on high mountains it hardens into ice. In the course of time huge mass of ice is formed and it begins to slide

down the mountain slope. These sliding masses are called *Glaciers*. They move very slowly, some of them move only a few inches or feet in a year. As they slide down a mountain slope, they scoop out valleys and bring with them stones, etc. On reaching warm regions they melt and leave down the stones brought with them. After melting they form rivers or lakes.

Iceberg is a huge mass of floating ice. Polar regions are very cold. The glaciers cannot melt in ground journey but reach the sea and fall into it thus breaking up into huge masses of ice, some of them are of an enormous size. They float about in the sea and are called *icebergs*. When they reach warm latitudes, they melt and deposit all the material brought in them. They help to raise the level of the sea-bed.

Volcanoes are mountains which have been formed conical in shape by the accumulation of layers of lava. The interior of the earth is hot enough even to melt the hardest rocks. The hot matter, that is, lava, etc., in the interior of the earth is pressed down by the pressure of the crust. Whenever it finds a weak spot in the crust it gushes out through a crack or a hole and accumulates round it. Sometimes rain water or sea water percolates into the soil and sinks deep down into earth. There it is converted into steam by the internal heat and forces its way out of the crust bringing with it large quantities of ashes, lava, etc. Gradually, in the course of thousands of years, this mass of lava grows big enough to be called a mountain. This lava forms a plateau when it spreads over the surface.

Earthquakes. An earthquake is a sudden, violent shaking of a part of the earth. *Quake* means to shake, to shudder, to tremble for want of firmness. Many towns are destroyed and there occurs a considerable loss of life and property. Some places are submerged under the sea. Big cracks and fissures are formed on the surface of the earth which interrupt communication. Sometimes rivers disappear or change their courses. At the same time they may be useful to man to a certain extent. Pr cious matter and minerals may crop up to the surface, new springs may be formed, and new lands for habitation may appear above the surface of the sea.

How is an earthquake caused? There are various causes. A dormant volcano (a volcano which suddenly rises into

activity after having remained inactive for years on end), when it rises into activity or an active volcano when it discharges matter with greater violence, shakes the surrounding area. Sometimes water percolates deep down into the earth and turn into steam on account of the internal heat. The steam on expanding tries to force its way out and causes an earthquake. When the interior of the earth cools and contracts, the outer crust in some places cracks, or some part of it actually drops down. This also causes an earthquake.

Water in its various forms—rains, rivers, sea, frost, glaciers, icebergs, etc.—brings about changes on the surface of the earth.

Wind. A wind is simply a stream of air moving horizontally. Winds are caused by the unequal air pressures at different places on the earth. Just as water seeks to keep its level, air also tends to equalize its pressure. Winds blow from regions of high pressure to regions of low pressure. As for example, near the Equator the air is hot because all the year round the rays of the sun fall almost perpendicularly and consequently the pressure is low. Therefore winds from high pressure areas north and south of the Equator blow towards the Equator.

Like running water, the wind is an agent of erosion as well as of transport. The sandblast, blowing over the surface of exposed rocks, rubs particles from them and grinds them down, polishing and smoothing them. Strong winds blow away sand from one place to another. Thus huge mounds, called *sand dunes*, are found in the Sahara and Rajputana.

Cyclone (*Gard-o-baad*). In the tropical and temperate regions storms are frequently called cyclones in which the wind blows spirally towards a centre. A cyclone is constantly moving its position, generally in a more or less easterly direction. The approach of a cyclone is indicated by an unusually high barometer and a very clear atmosphere. Later, halos are frequently seen round the sun and the moon; the barometer begins to fall and the air becomes heavy, hot and moist. The barometer continues to fall rapidly and the wind freshens.

Anti-cyclone is the opposite condition of a cyclone. It has a high barometric pressure in the centre which decreases

outwards. Anti-cyclones are not very violent. They travel much more slowly and irregularly than do the cyclones.

Dust-storm is caused by the approach of cyclones in which the fall of pressure is rapid from the circumference to the centre.

Dune is a ridge of sand caused by shifting of wind on the sand. Dunes are generally steeper on the leeward than on the windward side. Inland regions of low rainfall have the most extensive dunes. On the Sahara Desert, dunes often reach a height of 600 ft.

Tornadoes are cyclonic storms of great violence but of small extent. They advance rapidly and work great havoc along comparatively narrow paths.

Hurricane is a violent windstorm usually accompanied by rain. It is common in tropical regions, occurring in August, September and October. It is a term used to indicate the highest velocity in wind force, although it is not as violent as a tornado. They are quiet in th ecentre, but have high velocities at their outer sides. The mass travels forward slowly, usually 6 to 12 miles per hour, while circular motion is from 60 to over 150 m.p.h.

Breezes. During day-time the air above the land becomes hotter than the air above the sea and a landward breeze results. During the night the air over the sea is warmer than the air over the land and a seabreeze results.

Monsoons are seasonal winds which blow over the Indian Ocean and adjacent lands. The north-east monsoon blows during the winter months from October to March, and the south-west monsoon from April to September.

The north-east monsoon is caused by the cooler air over the land mass of India and East Pakistan passing to an area of lower pressure over the ocean which retains its heat longer than the land.

Trade Winds are so called because blowing with great regularity throughout the year, north-east in the northern hemisphere and south-east in the southern hemisphere, they

gave great assistance to trading vessels in the olden days when ships depended on the winds to propel them. The other reason is that the word 'trade' in this sense comes from the word 'tread' meaning a track. As these winds always blow in the same direction (track, tread) they came to be called trade winds. Generally, these winds blow from 30°N and 30°S towards the Equator but owing to the rotation of the earth their direction is somewhat changed.

Anti-trade Winds (Westerlies.) These winds blow from 30° to 60° in the northern and the southern hemispheres, towards the Poles. Their direction is south-west in the northern hemisphere and north-west in the southern hemisphere. They are called "Westerlies" because wherever they blow, they cause rain in the western part of the countries due to their direction.

They are more regular in the southern hemisphere, where they are not interrupted by land masses, and may become so strong that between latitudes 40° and 50° they are known as the "Roaring Forties".

Fog. When hot moist air comes in contact with cold air or cold water, it is cooled and some of the water vapour condenses round the floating particles of dust in the atmosphere. This is called *fog*. They are very common in industrial towns like London and at places where warm and cold currents meet, *e.g.*, Newfoundland.

Mist. Mist and fog are identical and are formed in the same way. The only difference is that in mist the water particles are bigger and wetter.

Dew. It does not fall from the sky. It is formed by the cooling of the moisture-laden air on the surface of the earth. At night, everything radiates heat which it has absorbed during day. Grass, flowers and leaves radiate heat more quickly than many other things and thus become very cold. When moist air touches them it is also cooled and cannot hold the same amount of water as before. A part of the water vapour is condensed and deposited on these things in the form of water drops which we call *dew*.

For the formation of dew it is necessary that objects should radiate heat thoroughly, so that the air coming in contact with them may be sufficiently cooled and the water

vapour should condense into water. Dew is not formed on cloudy night or in shady places, because the radiation is not sufficient for the water vapour to condense.

Cloud. A cloud is a large condensed mass of water vapour elevated in the air and possibly frozen into tiny particles of ice.

Air is never quite free from dust. When water vapour condenses, each minute drop of water is formed around a particle of dust as a nucleus. As a rule, the drops of water so formed are at first so small that they remain suspended in the air for a long time, just as a dust itself does. This "water dust", as we may better call it, constitutes a cloud, or, if it happens to be formed close to the earth's surface, a fog or mist. A cloud is simply a mist at a high level.

Clouds have great effect on climate. They diminish extremes of temperature by lessening the effect of the sun's heat during the day and by intercepting the heat radiated from the earth at night. It is commonly experienced that the clearest nights are also the coldest.

There are three main formations of cloud that can easily be recognised from the translations of their Latin names: *stratus*, a flat layer; *cumulus*, a heap, a pile or pack; and *cirrus*, a lock of curly hair. Other formations very often combine these. In the following formations *alto* means high and *nimbo* or *nimbus* means rain.

Cumulus. Height up to 8,000 feet. The clouds have flat base, and high rounded tops. Small white, scattered puffs mean fair weather, but heavy, deep clouds often become cumulo-nimbus.

Stratus. Height up to 8000 feet. This cloud looks like fog that has lifted from the ground.

Stratocumulus. Height up to 8,000 feet. Broad layers in this kind of a cloud are arranged in round masses on rolls, often so close together that their edges join.

Nimbostratus. Height up to 8,000 feet. These clouds are dark grey with bases that are the same throughout. They often give continuous rain or snow, if they do not reach the ground they appear to trail.

Cumulonimbus. Height up to 8,000 feet. It is thunderstorm cloud, heavy, dark and very tall—as high as 3 miles. Tops often spread out in anvil-shape. This cloud gives showers of rain, snow, hail, etc.

Altocumulus. Height 8,000 feet to 15,000 feet. This kind of cloud has small, thin rounded patches, resembling cumulus, sometimes so close together that their edges meet.

Altostratus. Height 8,000 feet to 15,000 feet. The cloud has sheet or veil, sometimes thin, but sometimes so thick that it blocks out the moon or even the sun, when it normally indicates continuous rain.

Cirrus. Height from 15,000 feet up. The cloud has detached pieces, delicate and feathery ('mares' tails).

Cirrocumulus. Height from 15,000 feet up. These clouds are small flakes or rolls in groups or lines ('mackerel sky'). They are made up of ice crystals.

Cirrostratus. Height from 15,000 feet up. These clouds are thin, milky veils producing a ring of light around the moon.

Rain. We have seen that winds are constantly blowing from one direction to another on account of unequal air pressures at different places of the earth. There is a high temperature in the torrid zone all the year round. The air is heated and absorbs a great deal of moisture. This hot and moist air is very light and rises high up. In upper regions it is cooled and condensation takes place which we see in the form of clouds. On a still further cooling the water-drops become too heavy to remain suspended in the air. They fall down in the form of rain.

Rain brings about several changes on the surface of the earth. Rain-water dissolves such parts of rock as are soluble and erodes the remaining parts. Sometimes it enters the rocks, lubricates them, and makes them slippery. Thus, portions of rocks are broken off and they slide down. When passing through the air, rain-water absorbs some carbon dioxide gas.

Hail. When rain-drops on their way to the earth pass through a region of intense cold, they freeze and become hails. Falling hailstones gather round them raindrops which also freeze, thus increasing the size of the hailstones.

Snow falls in winter in high mountains or in very cold countries. It is light and looks like pieces of cotton wool. Hardened snow is ice. When the clouds ascend to intensely cold regions of temperature, they freeze without passing through the liquid form and fall as snow.

Artesian Wells are of great depth. They are so called because they were first made at Artois in France. These wells tap water-bearing strata beneath impervious strata of rock. The water rises in the borehole into an ordinary well at the surface and thoroughly protected by a cement and brick lining. Artesian wells are used to great advantage in Australia, where little or no surface water is available.

Geyser (*Garm chashma*) is a fountain which sprouts boiling water. The chief geysers of the world are found in Iceland, New Zealand, and Yellow Stone Park (U.S.A.). A geyser is caused by the internal heat of the earth which converts water into steam. This steam forces its way out of a weak point in the crust of the earth. Thereupon it is converted into boiling water and sprouts up like a fountain.

The Continents. A continent is a large mass of land, not broken up by a large stretch of sea. On the earth's surface there are six such continents, as well as a large number of islands. The continents may be classified into four main divisions: (1) an immense landmass nearly the whole of it in the eastern hemisphere: the continents of *Asia*, *Africa* and *Europe*; (2) a smaller landmass in the western hemisphere: the *Americas viz.*, two continents: North America and South America; (3) two large island continents in the southern hemisphere: Australia and Antarctica; (4) a great number of islands.

Islands are generally regarded as belonging to the nearest continent. The far-flung islands of the Pacific are usually grouped with New Zealand, Australia and New Guinea in the continent of Oceania.

The Arctic is a sea and not a continent although the ice that forms over it in winter is fairly solid. On the other hand Antarctic is regarded as a continent, the ice and snow covering the Antarctic have formed above land which rises above sea level.

More than half of the land in the world is rock, desert,

tundra, dense jungle, swamps or is covered with ice and therefore not inhabitable. The remaining portion of land is suitable for cultivation. About one-half of the people in the world live in one-thirtieth of the total area of land. There are immense areas like the North-West territories of Canada, and the Northern territory of Australia which contain only one inhabitant to every 25 or 50 square miles, whereas there are other areas like East Pakistan and England where more than 800 persons, on the average, are crowded into each square mile of land.

Continents: Area

Continent		*Area (square miles)*	*Percentage of world area*
Asia	..	1,74,61,583	30.4
Africa	..	1,16,96,572	20.4
North America	..	93,57,026	16.3
South America	..	68,68,098	12.0
Europe	..	35,25,755	6.2
Oceania	..	33,03,002	5.8
Antarctica	..	51,00,000	8.9

Highest and lowest points in each continent

Continent	*Highest*	*Height*	*Lowest Point*	*Depth below sea-level ft.*
Europe	Mt. Elbrus, Caucasus USSR	18,481	Polders Netherlands (2)	12—15
Asia	Mt. Everest, Nepal-Tibet.	29,028	Dead Sea Jordan	1,286
Africa	Mt. Kilimanjaro (Kibo Peak), Tanganyika.	19,321	Qattara Depression, Egypt, U.A.R.	436
North America.	Mr. McKinley, Alaska, U.S.A.	20,320	Death Valley, U.S.A.	282
South America.	Mr. Aconcagua, Argentina-Chile.	22,835	Rio Negro Argentina	98
Oceania	Mt. Carstensz-toppen, New Guinea.	16,404	Lake Eyre South Australia	38
Antarctica	Mt. Markham	15,100	Interior	8,200 (ice-filled)

Oceans and Seas. In the deep hollows of the earth's crust lie the oceans. They cover three-quarters of the surface of the globe. In some places the low-lying edges of the deep oceans there are stretches of shallow water. The oceans form one connected expanse of water, although we have divided them for convenience into different parts such as the Atlantic Ocean, the Pacific Ocean, the Indian Ocean, the Southern Ocean etc. The bottom of the oceans consists of the most part of monotonous, nearly level plain; diversified in places by long ridges and occasional isolated peaks rising nearly or quite to the surface. In the latter case, they form oceanic islands. Running waters, wind and moving ice, which play so large a part in sculpturing the land surfaces, cannot attack the surface floor. The sinking down of the portions of the crust, the outbreak of the volcanoes, etc. account for the chief submarine ridges and deeps.

In shallow water, down to about 100 fathoms, the sea floor consists of sand, gravel and mud, the composition of which depends on that of the neighbouring land, as these deposits are the result of denudation of the land by rain and rivers and the direct action of the sea on the coast. Large rivers deposit enormous quantities of very fine mud over areas extending, in some cases, hundreds of miles from their mouths. This mud is generally of slaty-blue colour, but green and red muds are also found.

In deeper water beyond the reach of any direct influence from the land, the sea-floor is mainly composed of remains of marine organism and of the products of volcanic eruptions. The deposits which cover the greatest area are called Globigerina Ooze and Red Clay. The former is, largely, composed of shells of minute animals, mainly foraminifera, and its chief constituent is calcium carbonate (chalk), mixed with volcanic minerals. Red Clay covers the deepest parts of the ocean floor over an immense area. It consists mainly of volcanic and meteoric dust and of silicious remains of shells similar to those which form Globigerina Ooze. Very deep water containing a good deal of carbonic acid dissolves the chalky portions of the shell, and the insoluble remainder falls to the bottom. The principal part of the Red Clay, however, is probably of volcanic origin.

Troughs are regions where the ocean is very deep. The most famous troughs or deeps include the Japan or Tuscaroar Deep and the Challenger Deep in the West Pacific.

Oceans and Main Seas

(*Their areas and depths*).

Ocean or sea	Area (sq. miles)	Average depth (ft.)	Greatest depth (ft.)
ceans			
Pacific ..	6,38,01,668	14,048	35,948 (off Mindanao.)
Atlantic ..	3,18,39,306	12,880	30,246 (off Puerto Rica trench)
Indian ..	2,83,56,276	13,002	22,968 (off Surda Trench)
Arctic ..	54,40,197	3,953	17,850 (off North Pole)
Seas			
Malay Sea ..	31,44,056	3,976	21,342
Caribbean Sea ..	9,66,757	4,878	16,798
Bering Sea ..	8,75,753	7,714	13,422
Gulf of Mexico ..	5,95,760	4,961	12,744
Sea of Okhotsk ..	5,89,807	2,749	11,154
East China Sea ..	4,82,317	617	10,500
Hudson Bay ..	4,75,762	420	1,500
Sea of Japan ..	3,89,074	4,429	12,276
Andaman Sea ..	3,07,954	2,054	12,392
North Sea ..	2,22,124	308	1,998
Black Sea ..	1,78,378	3,160	6,864
Red Sea ..	1,69,073	1,161	7,254
Baltic Sea ..	1,63,059	189	1,380

The Malaya is not given on map. It consists of the following seas: Sulu, Celebes, Molucca, Halmahera, Ceram, Banda Arafura, Timor, Flores, Bali, Java, Savu and South China. The gulfs of Thailand, Tomini, and Boni and the straits of Malacca, Singapore and Macassar are also included.

Average depth of ocean below sea-level is 12.500 ft.

Mean temperature of the sea is about 32.6 centigrade.

Ocean Currents are, so to say, rivers of warm or cold water, flowing in an ocean. Just as a motion of the air is due to difference in atmospheric pressure at different places, movements of the ocean water are similarly due to the difference in temperature of water. When any body of water is heated in one place and cooled in another, differences of density are produced which set up convection currents, as for example, if you heat water in a pot from below, the water will begin to move in upward and downward currents. In the oceans there is a slow general circulation due to the settling of cold, dense water to the bottom in the polar seas. The cold water flows along the bottom towards the Equator, where it slowly rises getting warm at the surface and flowing again towards the poles. Thus even the deepest parts of the oceans are not stagnant. Were they still, they could not continue to support the animal life that is found even at the greatest depths. Deep sea organism depend for their life on oxygen dissolved in the water. In case the water were not in circulation this would soon be exhausted.

The currents also owe their origin directly or indirecly to the prevailing winds. If winds blow in one direction for a considerable period of time they cause part of the ocean water to flow in the same direction and thus produce currents.

Important Ocean Currents

Ocean	*Current*
Atlantic	(*i*) Antarctic Current (cold).
	(*ii*) Benguela Current (cold).
	(*iii*) South Equatorial Current.
	(*iv*) Brazil Current.
	(*v*) Gulf Stream.
	(*vi*) North Equatorial Current.
	(*vii*) North Atlantic Current.
	(*viii*) Labrador Current.
Pacific	(*i*) Peruvian Current.
	(*ii*) East Australian Current.
	(*iii*) Kurro Siwo Current.
	(*iv*) North Pacific Drift.

Indian (*i*) Agulhas Current (flowing between Island of Madagascar and Africa).
(*ii*) Somali Current.
(*iii*) North-East Monsoon Drift.
(*iv*) South-West Monsoon Drift.

The Gulf Stream is the most important current of the Atlantic Ocean. It issues through the Strait of Florida at a speed of five miles an hour. It is 50 miles wide and 550 fathoms (fathom=7 feet) deep. It sweeps along the American coast growing wider and shallower. At about latitude 40° north it turns to the east diminishing its velocity and passes along the west coast of Europe. It is responsible for mild climate of Great Britain and for the warmth and moisture of south west-wind.

Tides. *Vide* 'Tides' in the chapter on General Astronomy.

Waves. A wave is a ridge on the surface of water swaying or moving backwards and forwards. There are so many factors which cause them. The wind sets the ocean waters rising and falling on huge waves which dash against the shore and help wear the lands away. Great waves are also caused by earthquakes and eruptions on the sea floor and these waves are a danger to ships. In the Atlantic Ocean such great waves are set up by the frequent volcanic outbursts which take place on the part of the mid-Atlantic ridge near the Equator. The waves travel for thousands of miles across the ocean, tower higher and higher as they are cramped in the shallower seas.

Lake (*Jheel*) is a depression of land containing water. The formation of a lake is usually caused by interference with the drainage of an area. The most common interfering agent is the glacier which scours out hollows in the topography in some places, in other dumps, great masses of dirt and debris occasionally blocking the course of a river and compelling it to form a lake.

The life-history of all kinds of lakes is rather brief, and even the largest lakes will at last disappear, either by filling or by the removal of the barrier which holds their water.

Whenever they exist, 'they indicate either a youthful stage of drainage or an accident to existing drainage or the result of recent aggrandisation by the streams'. The ancient lakes have already been filled up and have become land, others are in the process of drainage.

Important Lakes of the World

Name	*Country*	*Length (Miles)*	*Area (sq. m.)*	*Salt or fresh*
Caspian Sea	Asia	680	1,69,330	Salt
Superior	North America	200	31,820	Fresh
Sea of Aral	Russia	265	26,233	Salt
Victoria Nyanza	Africa	200	26,200	Fresh
Huron	North America	247	23,010	Fresh
Michigan	North America	307	22,400	Fresh
Baikal	Russia	385	13,200	Fresh
Tanganyika	Africa	420	12,700	Fresh
Great Bear Lake	Canada	195	11,660	Fresh
Great Slave Lake	Canada	325	11,170	Fresh
Lake Nyasa	Africa	350	11,000	Fresh
Lake Eric	North America	241	9,940	Fresh
Winnipeg	Canada	260	9,398	Fresh
Ontario	U.S.A.-Canada	193	7,540	Fresh
Chad	Africa	—	7,200	Fresh

Caspian Sea and Aral Sea have been classified as lakes, despite their names, as they are completely land-locked.

In flood Lake Chad covers 50,000 square miles and becomes the world's largest fresh-water lake.

Islands. Most of the islands are pieces of rising ground which were separated from the mainland by the drowning of the lower land which surrounded it. They lie close to the continents and are separated from them only by shallow seas. Smaller islands, however, such as St. Helena, the Azores, etc., lie far from the continents and do not equal them in their build. Some of them are built of volcanic rock and are due to volcanic outburst from the ocean floor. The volcanic cone grows taller and taller, until its summit

rises above the waves. The Hawaiian group is an example. It still has active volcanoes. The oceanic islands which are not volcanoes, are built up of coral and coral sand.

Largest Islands

Island	*Ocean*		*Area (sq. m.)*
Australia (a continent island)	Indian	Oceania	29,48,366
Greenland	Arctic	N. America	8,39,782
New Guinea	Pacific	Oceania	3,16,861
Borneo	Pacific	Asia	2,85,000
Baffin Islands	Arctic	N. America	2,36,000
Madagascar	Indian	Africa	2,27,737
Sumatra	Indian	Asia	1,61,612
Philippine Islands	Pacific	Indian	1,14,400
Honshsu	Pacific	Asia	88,919
Great Britain	Atlantic	Europe	84,186
Victoria Is.	Arctic	N. America	80,450
Celebes	Indian	Asia	73,160
South Island, N. Z.	Pacific	Oceania	58,093
Java	Indian	Asia	48,534
North Island, N. Z.	Pacific	Oceania	44,281
Cuba	Atlantic	N. America	44,206
Newfoundland	Atlantic	N. America	42,734
Ellesmere Is.	Arctic	N. America	41,000
Luzon	Pacific	Asia	40,420
Iceland	Atlantic	Europe	39,758
Mindanao	Pacific	Asia	36,537
Hokkaido	Pacific	Asia	34,276
Novaya Zemlya	Arctic	Asia	32,000
Ireland	Atlantic	Europe	31,839
Hispaniola	Atlantic	N. America	29,536
Tasmania	Pacific	Oceania	26,215

CHAPTER 2

INTERESTING GEOGRAPHICAL DATA

Sec. I. World's Largest Deserts

Desert		*Area (sq. m.)*
The Great Sahara (Africa)	..	20,00,000
The Great American	..	10,50,000
Gobi (Asia))	..	3,00,000
Tibet (Asia)	..	2,30,000

Sec. II. Lowest Parts of the Earth Below Sea-level

Death Valley (California)	276 ft.	Libyan Desert	440 ft.
Caspian Sea (Russia)	86 ,,	Lake Eyre	39 ,,
Dead Sea (Palestine)	1,290 ,,	Desert of Sahara	150 ,,

Sec. III. Important Rivers of the World

River	*Continent*	*Approximate length (miles)*	*Outflow into*
Nile	Africa	4,145	Mediterranean Sea.
Amazon	S. America	3,900	Atlantic Ocean.
Yangtze Kiang	Asia	3,100	Pacific Ocean.
Lena	Asia	2,800	Arctic Ocean.
Congo	Africa	2,718	Atlantic Ocean.
Mackenzie	N. America	2,635	Arctic Ocean.
Mekong	Asia	2,600	South Chinese Sea.
Amur	Asia	2,600	Gulf of Tartary.
Ob-Irtish	Asia	2,600	Gulf of Ob/Pacific.
Hwang Ho (Yellow).	Asia	2,600	Yellow Sea (Pacific)
Niger	Africa	2,550	Atlantic Ocean.
Yenisei	Asia	2,550	Arctic Ocean.
Missouri	N. America	2,475	Mississippi River.
Mississippi	N. America	2,470	Gulf of Mexico.
La Plata Parana	S. America	2,300	Atlantic Ocean.
Murray-Darling	Australia	2,300	Southern Ocean.

Volga	Europe	2,290	Caspian Sea.
Yukon	N. America	1,979	Bering Sea.
St. Lawrence	N. America	1,945	Atlantic Ocean.
Rio Grande	N. America	1,800	Gulf of Mexico.
Danube	Europe	1,725	Black Sea.
Euphrates	Iraq	1,700	Persian Gulf.
Indus	Pakistan	1,700	Arabian Sea.
Brahmputra	Pakistan and India.	1,680	Bay of Bengal.

Sec. IV. Popular Geographical Epithets

Blue River	The Yangste-Kiang
Blue Mountain	The Nilgri Hills
Britain of the South	New Zealand
City of Colleges	Lahore (W. Pakistan)
City of Seven Hills	Rome
City of Silent Thoroughfares	Venice
City of Bazars	Cairo
City of Magnificent Distances	Washington (U.S.)
City of Ghosts & Temples	Benares
City of Popes	Rome
City of Sky-Scrapers	New York
Cockpit of Europe	The Balkans
Dark Continent	Africa
Emerald Island	Ireland
Empire City	New York
Eternal City	Rome
Forbidden City	Lhasa (Tibet)
Forbidden Land	Tibet
Granite City	Aberdeen
Great Britain of the Pacific	Japan
Garden of South India	Tanjore
Gateway of Pakistan	Karachi (W. Pakistan)
Gate of Tears	The Strait of Babel-Mandeb (Red Sea)
Gibraltar of the West	Quebec
Gibraltar of the Indian Ocean	Aden
Gift of the Nile	Egypt
Human Equator of the Earth	The Himalayas
Island Continent	Australia
Island of Cloves	Zanzibar

Isle of Pearls	Bahrein (Persian Gulf)
Key to the Mediterranean	Gibraltar
King of Indian Forests	Teak
Land of Cakes	Scotland
Land of Deserts	Africa
Land of the Midnight Sun	Hammerfest (Norway)
Land of Morning Calm	Korea
Land of the Rising Sun	Japan
Land of Golden Fibre	East Pakistan
Land of Golden Fleece	Australia
Land of Maple	Canada
Land of Thousand Islands	Finland
Land of White Elephants	Siam
Never Never Land	Prairies of N. Australia
Paradise on Earth	Kashmir
Pillars of Hercules	Strait of Gibraltar
Playground of Europe	Switzerland
Pearl of Antilles	Cuba
Queen of the Adriatic	Venice
Queen of the South	Sydney
Queen of the Netherland	Brussels (capital of Belgium)
River in the Sea	The Gulf Stream
Rome of India	Delhi
Roof of the World	The Pamirs
Silver City	Algiers
Sorrow of China	The Hwang Ho (river)
Venice of the North	Stockholm
Venice of the East	Bangkok (capital of Siam)
World's Loveliest Island	Tristian de Cunna (Mid-Atlantic)
Whiteman's Grave	Guinea Coast of Africa
Wilderness of Bamboo and Paper	Tokyo
Windy City	Chicago
Yellow River	The Hwang Ho

Sec. V. Biggest, Greatest, Largest, Longest, Highest etc.

Biggest Dam	Dnieper Opetrovsk (Russia)
Biggest Museum	British Museum (London)
Biggest Ocean	The Pacific

Biggest Park	Yellow Stone National Park (U.S.A.) 3,350 sq. miles
Biggest Railway	Trans-Siberian Railway
Coldest Park	Belt between Arctic and North Pole in Arctic
Coldest Place	Verkhoyansk (in North-East Siberia, 90° below zero)
Densest Population	Java, 817 to a square mile; England 750
Deepest Lake	Lake Baikal (Siberia)
Deepest Ocean	The Pacific Ocean
Finest Harbour	Sydney Harbour
Greatest Jute Producer	East Bengal (Pakistan)
Greatest Ocean Depth	Mindanao (between Japan and the Philippines) 36,400 ft.
Greatest River Depth	815 feet below sea-level.
Greatest Wool Producer	Australia
Highest Building	Soviet Palace, Moscow
Highest Dam	Boulder Dam (U.S.A.)
Highest Lake	Lake Titica (Bolivia 12,000 feet above sea)
Highest Mountain	The Himalayas
Highest Peak	Mt. Everest
Highest Plateau	Pamir (Tibet)
Highest Statue	Statue of Liberty (New York Bay)
Highest Town	Pasco (Peru)
Highest Volcano	Chimborazo (S. America)
Hottest Place (Pakistan)	Jacobabad (128°)
Hottest Place (World)	(*i*) Aziz (Tripolitania) 136° (*ii*) Death Valley (California)
Largest Artificial Waterway	Grand Canal (China)
Largest Battleship	Queen Elizabeth, 85,000 tons
Longest Bridge	San Francisco (Oakland)
Largest Building	The Great Pyramid at Gizeh (Egypt)
Largest City	London
Largest Continent	Asia
Longest Day (in northern hemisphere)	22nd June

Largest Desert	The Sahara (Africa)
Largest Diamond Mine	Kimberley (South Africa)
Largest Diamond	Cullinan (3,106 carats)
Largest Island	Australia
Largest Fresh-water Lake	Lake Superior
Largest Library	Bibleotheque National (Paris, over 18 lakh items)
Largest Mountain Chain	The Andes
Largest Ocean	Pacific
Largest Peninsula	India
Largest Planet	Jupiter
Largest Railway Platform	Sonepur (India)
Largest Railway	Grand Central Terminal (New York)
Largest River	Amazon
Largest Salt-water Lake	Caspian Sea
Largest Ship Canal	Baltic-White Sea Canal (152 miles)
Largest Silver Producer	Mexico
Largest Telescope	At Mt. Palomar (California) diameter of reflector 200 inches
Largest Tree	Gen. Sharman Tree (California)
Longest Tunnel	Simplon (Switzerland) over 12 miles
Largest Wall	The Great Wall of China (1,250 miles)
Longest River	The Mississipi (4,502 miles)
Most Populous Country	Indo-Pak subcontinent
Nearest Planet	Venus
Rainiest Place	Cherrapoonjee (Assam)
Saltiest Sea	Dead Sea
Smallest Planet	Mercury

Sec. VI. Important Seaports

Port	*Country*	*Port*	*Country*
Alexandria	Egypt	Bristol	England
Amsterdam	Holland	Buenos Aires	Argentina
Antwerp	Belgium	Calcutta	India
Bahia	S. America	Cardiff	England
Bombay	India	Chittagong	Pakistan

Colombo	Ceylon	Rangoon	Burma
Genoa	Italy	New Castle	England
Glasgow	Scotland	New Orleans	U.S.A.
Hamburg	Germany	New York	U.S.A.
Hong-Kong	China	Philadelphia	U.S.A.
Karachi	W. Pakistan	Rotterdam	Netherlands
Liverpool	England	San Francisco	U.S.A.
London	England	Singapore	Malaya
Manchester	England	Shanghai	China
Montreal	Canada	Sydney	Australia
Marseilles	Francean	Wellington	New Zealand
Monte Video	Uruguay	Yokohama	Japan

Sec. VII. The World's Largest Cities

City	*Country*	*Population Approximate*
Tokyo	Japan	1,01,16,000
London	England	88,00,000
New York	U.S.A.	79,86,000
Shanghai	China	69,00,000
Moscow	U.S.S.R.	50,32,000
Mexico City	Mexico	48,29,000
Bombay	India	41,52,000
Peking	China	41,40,000
Sao Paulo	Brazil	38,50,000
Buenos Aires	Argentina	37,90,000
Chicago	U.S.A.	35,50,000
Cairo	U.A.R.	33,46,000
Djakarta	Indonesia	33,17,000
Rio de Janeiro	Brazil	33,07,000
Leningrad	U.S.S.R.	33,00,000
Berlin	Germany (E & W)	32,86,000
Honkong	China	31,00,000

(*N.B.*—The population figures continue to increase, the student should keep abreast of the change).

Sec. VIII. Important Bridges of the World

Name	*Length*
San Francisco Bay (U.S.A.)	4½ miles
Lower Zambese Bridge (East Africa)	over 2 miles
Storstorom (Denmark)	„ 2 „

Tay Bridge (Scotland)	over 2 miles
Forth Bridge (Scotland)	„ 1½ „
Sone Bridge (India)	„ 1½ „
Golden Gate (San Francisco)	9,000 ft.
Sydney Harbour (Australia)	3,800 ft.

Sec. IX. Towns Associated with Industries

Ahmedabad (Bombay)	Textiles.
Baku (Russia)	Petroleum.
Bangkok (Siam)	Rice.
Bareilly (India)	Woodwork.
Belfast (Ireland)	Linen and shipbuilding.
Bethume (France)	Coalfield.
Bombay (India)	Textiles.
Buenos Aires (Argentina)	Dairy produce.
Cadiz (Portugal)	Cork.
Chandraghona (E. Pakistan)	Paper (Karnaphuli Mills)
Chicago (America)	Agricultural implements, grain and meat market.
Cologne (Germany)	Eau-de-Colonge (a scent)
Dacca (East Pakistan)	Shell-carving, jute, buttons, *sari* and muslin.
Darjeeling (W. Bengal)	Tea and cinchona.
Detroit (U.S.A.)	Automobiles.
Dum Dum (W. Bengal)	Ammunition.
Dundee (Scotland)	Jute and linen manufacture.
Essen (Prussia)	Engineering works.
Glasgow (Scotland)	Machinery and textiles.
Gujrarwala (West Pakistan)	Iron safes, almirahs, rice and utensils.
Havana (Cuba)	Tobacco and cigars.
Hollywood (U.S.A.)	Film industry.
Jamshedpur (Orissa)	Iron and steel industry.
Johannesburg (S. Africa)	Gold mines.
Kansas (U.S.A.)	Meat-packing.
Katni (India)	Cement.
Kimberley (S. Africa)	Diamond mining.
Kolar (Mysore)	Gold-mines.
Leeds (England)	Woollen goods.
Los Angeles (U.S.A.)	Film producing, oil-boring.

Lyallpur (West Pakistan)	Textiles.
Lyons (France)	Silk industries.
Mardan (West Pakistan)	Sugar.
Mauritius (Indian Ocean)	Sugar.
Melbourne (Australia)	Chocolate manufacturing.
Milan (Italy)	Silk.
Morocco (N. Africa)	Leather.
Multan (West Pakistan)	Pottery.
Munich (Germany)	Lenses.
New Orleans (U.S.A.)	Cotton.
Nottingham (England)	Lace Industry.
Paris (France)	Fineries.
Pittsburg (U.S.A.)	Iron and steel.
Plymouth (England)	Shipbuilding.
Raniganj (West Bengal)	Coal-mines, paper mills.
Rahimyar Khan (West Pak.)	Textiles.
Sheffield (British Isles)	Cutlery.
Sialkot (West Pakistan)	Sports goods.
Sui (West Pakistan)	Sui-gas.
Sukkur (West Pakistan)	Biscuits.
Srinagar (Kashmir)	Woollen shawls, silk.
Sylhet (East Pakistan)	Tea, shell-carving.
Titagarh (West Bengal)	Paper.
Trichinopoly (Madras)	Cotton, tobacco.
Venice (Italy)	Glass manufacture.
Vienna (Austria)	Glass manufacture.
Wazirabad (West Pakistan)	Cutlery.
Wah (West Pakistan)	Cement.
Wellington (New Zealand)	Dairy products.
Yenangyaung (Burma)	Oilfields.

Sec. X. Changed Geographical Names

Old	*New*
Angora (Turkey)	Ankara.
Constantinople (Turkey)	Istanbul.
Dutch East Indies	United States of Indonesia.
Irish Free State	Eire.
Manchukuo (China)	Manchuria
Mesopotamia	Iraq
Peking (China)	Peiping

Persia	Iran
Petrograd (Russia)	Leningrad
Sandwich Islands (Pacific Ocean)	Hawaiian Islands
Siam	Thailand
Tripoli	Libya

Sec. XI. National Names of Countries

Abyssinia	Ethiopia	Irish Free State	Eire
Austria	Oessterreich	Japan	Nippon
Belgium	La Belgique	Norway	Norge
China	Chugn Kuo	Persia	Iran
Egypt	Misr	Poland	Polaska
Finland	Soumi	Siam	Thailand
Germany	Deutschland	Spain	Haspania
Greece	Hellas	Switzerland	Helvitia
Hungary	Magyarozag	India	Pakistan and Bharat
Holland	Netherlands		

Sec. XII. Important Sites, Buildings and Streets

Arafa (*Arafat*). A hill near Holy Mecca.

Anarkali. A business centre of Lahore (West Pakistan).

Balmoral Castle. A royal residence in Aberdeenshire (Scotland) for the King and Queen of England.

Big Ben. Clock in Westminster, on the tower of the Houses of Parliament.

Crystal Palace. In Hyde Park, London, where the Great Exhibition was held in 1851. Destroyed by fire, November, 1936.

Downing Street. Official residence of the British Prime Minister (No. 10), of the Chancellor of Exchequer (No. 11), and of the Chief Whip (No. 12).

Harappa. A place of excavations in Montgomery District (West Pakistan).

Hollywood. A suburb of Los Angeles, California, centre of Cinematographic Industry.

Hyde Park. In London, part of the property of Old Abbey of Westminster; pleasure resort.

Kaaba. Sacred place of pilgrimage for Muslims at Mecca.

Kremlin. The seat of Soviet Government in Moscow, formerly a citadel.

Lick. Observatory in California.

Mayfair. A district north of Piccadilly, London, so called from an annual fair held in May; aristocratic families live here.

Mohenjodaro. An ancient city excavated in West Pakistan.

Reuters. News Agency of world repute with headquarters at Thames embankment. (Founded by Dr. Reuter, a German).

Rotten Row. A road in Hyde Park, London, reserved for horse-riding.

Shantiniketan. University in W. Bengal (Bolpur) founded by Dr. Rabindranath Tagore.

Taj Mahal. Mausoleum of Mumtaz Mahal at Agra, built by her husband, the Mughal Emperor Shah Jehan.

Vatican (*Rome*). Official residence of the Pope.

Wall Street. In lower New York, U.S.A., the Stock Exchange.

White House. Official residence of U.S.A. President in Washington.

Whitehall (*London*). Government offices housed in Whitehall, once known as York Palace.

Sec. XIII. Trade Names and their Associations

Agfa	Photo goods
Bata	Shoes, tyres
Bayer	Medicines
Beck's	Beer
Big Ben	Alarm timepiece
Blackbird	Fountain-pen
Blackstone	Oil engines
Brook Bond	Tea
B.S.A.	Bicycle; gun
Chevrolet	Cars
Colt	Revolvers
Crooke's	Glasses for goggles, spectacles etc.
Davy	Safety-lamp

Deterding	Petroleum, steel
Dhariwal	Textiles
Dunlop	Tyre
Faraday	Electricity
Firestone	Motor tyres
Flex	Shoes
Flit	Mosquito-killer
Ford	Motors
Fry's	Cocoa; chocolates
Gillet	Safety Razor
Glaxo	Baby food: biscuits, glucose D
Godrej	Soap; safes
Goodyear	Motor tyres
Hercules	Cycles
Horlick's	Malted Milk
Horrackses	Cotton
Huntley and Palmer	Biscuits
Java	Sugar
Karnaphuli	Paper
Kodak	Film and photographic goods
Lal-imli	Textiles
Lever Brothers	Soap (Sunlight, Lux, Lifebuoy)
Lipton	Tea
Mangharam	Biscuits, toffees
Merk	Medicines
Murree	Beer
Oakes	Cigars
Park Davis	Medicines
Parker	Fountain pen
Pears	Soap, Encyclopaedia
Philips	Radios, bulbs, cycles, etc.
Player's	Cigarettes
Polson's	Coffee, butter
Ralli Brothers	Cotton and wheat trade
R.C.A.	Radios
Red Ensign	Cotton, tea
Remington	Typewriters
Roby and Lincoln	Oil engines
Rogers	Knives, forks
Rustum	Cycle
Schering	Medicines

Scissors	Cigarettes
Seven o'clock	Blades
Shalimar	Paints
Sheffield	Cutlery
Shell	Petrol
Sohrab	Cycle
Swan	Ink
Tata	Iron and steel industry
Titagarh	Paper
Thomas Cook	Shipping
Treet	Blades
Underwood	Typewriters
Valet	Safety razors
Waterman	Fountain pen, ink
Will's	Cigarettes
Yule	Engineering
Zeal	Thermometer
Zeiss-Ikan	Lenses, cameras
Zig-Zag	Cigarette paper

Sec. XIV. Foreign Currencies

Country	*Currency*	*Country*	*Currency*
Abyssinia	Talari	Czechoslovakia	Koruna
Albania	Lek	Denmark	Krone
Argentina	Peso	Dominican Republic	Peso
Australia	Pound (A)	Ecuador	Sucre
Austria	Schilling	Egypt	Pound (E)
Belgium	Franc	Ethiopia	Dollar
Bolivia	Peso Boliviano	Finland	Markka
Brazil	Cruziero	Formosa	New Taiwan Dollar
Britain	Pound	France	Franc
Bulgaria	Lev	Germany: East	Ostmark
Burma	Kyat	Germany: West	Deutsche
Canada	Dollar	Greece	Drachma
Ceylon	Rupee	Guatemala	Quetzal
Chile	Escudo	Haiti	Gourde
China	People's Bank Dollar	Holland	Florin
Colombia	Peso		
Costa Rica	Colon		
Cuba	Peso		

Country	Currency	Country	Currency
Hong Kong	Dollar	Pakistan	Rupee
Hungary	Forint		
Iceland	Krona	Panama	Balbao
India	Rupee	Paraguay	Guarani
Indonesia	Rupiah	Philippines	Peso
Iran	Rial	Poland	Zloty
Iraq	Dinar	Portugal	Escudo
Israel	Pound (I)	Saudi Arabia	Riaal
Italy	Lira	South Africa	Rand
Japan	Yen	Spain	Peseta
Jordan	Dinar	Sudan	Pound (S)
Lebanon	Pound (£L)	Sweden	Krona
Liberia	Dollar	Switzerland	Franc
Libya	Pound (L)	Thailand	Baht
Malaya	Dollar	Tunisia	Dinar
	(Malayan)	Turkey	Turkish Lira
Mexico	Peso	U.S.A.	Dollar
Netherlands	Guilder	U.S.S.R.	Rouble
Norway	Krone	West Indies	Dollar

Sec. XV. Seven Wonders of the World

(*a*) *Ancient.*

1. The Pyramids of Egypt.
2. The Temple of Diana at Ephesus in Rome.
3. The Hanging Gardens of Babylon.
4. Statue of Jupiter at Olympia (Greece).
5. The Tomb (Mausoleum) of Taj Mahal.
6. Colossus of Rhodes.
7. The Lighthouse on the Island of Pharos, off Alexandria.

(*b*) *Modern.*

1. The Empire State Building (New York).
2. The Panama Canal (Central America).
3. The Washington Memorial (America).
4. The Lloyd Barrage of Sukkur (Pakistan).
5. London's Underground Railway.
6. The Aswan Dam, Egypt.
7. The Golden Gate Bridge (San Francisco).

Sec. XVI. World's Parliaments and National Emblems

Country	*Parliament*	*Emblem*
Australia	Parliament	The Kangaroo
Canada,	Parliament	The White Lily
China	Kumintang	Narcissus
Denmark	Rigsdag	The Beach
England	Parliament	The Rose
Egypt	Darulawam	
France	Chamber	The Lily
Germany	Reichstag	The Cornflower
Iceland	Althing	
India (Bharat)	Parliament	The Lotus
Iraq	Parliament	
Ireland	Dail Eireann	The Shamrock
Italy	Senate	The White Lily
Japan	Diet	The Chrysanthemum
Netherlands	States Genera	
Norway	Storting	
Pakistan	National Assembly	Crescent
Persia (Iran)	Mejlis	The Rose
Poland	Sejm	
Scotland	Parliament	The Thistle
South Africa	Parliament	The Spring book
Spain	Cortes	The Pomegranate
Turkey	Grand National Assembly	
U.S.S.R.	Supreme Soviet	
U.S.A.	Congress	The Golden Rod
Yugoslavia	Skuptchina	
Wales	Parliament	The Daffodil

Sec. XVII. Largest Telescopes of the World

'Refractor' Telescope (gathering the rays together near the eye-piece, hence limited as to size).

	Name	*Size (Inches)*
1.	At Yerkes Observatory, University of Chicago (U.S.A.)	40
2.	At Lick Observatory, University of California (U.S.A.)	36

Name	*Size (Inches)*
3. At Mendon Observatory (France)	23½
4. At Astrophysical Observatory, Potsdam (Germany)	31½

'Reflector' Telescope (collecting the rays on a large mirror, and throwing them back to the eye-piece).

1. At California Institute of Technology (Pasadana, U.S.A., the largest telescope in the world)	200
2. At Carnegie Institute, Mt. Wilson (California, U.S.A.)	100
3. At Mount Loke (Texas, U.S.A.)	82
4. At David Dunlop Observatory, University of Toronto (Canada)	74

Sec. XVIII. Longest Railway Tunnels

Tunnels	*Miles*
Golders Green to S. Wimbledon (England)	16
Ben Nevis (England)	15
Simplon (Switzerland-Italy)	15
Tanna (Japan)	13½
Florence Bologna (Italy)	11¾
St. Gothard (Switzerland-Italy)	9¼
Lotschberg (Switzerland)	9¼

Sec. XIX. Greatest Waterfalls

Waterfall	*Country*	*Height in feet*
Tugela	Natal	2,810
Sutherland	New Zealand	1,900
Ribbon	California	1,610
Takakauw	Columbia	1,200
Vettisfos	Norway	850
Gerropha	Mysore (Bharat)	880
Kalamboo	Tanganyika	705
Fairy	U.S.A.	700
Terni	Italy	650
Niagra	Canada	175

Sec. XX. Various Riches and Natural Resources of Countries of the World in Order of Merit

Cotton	U.S.A., U.S.S.R., Egypt.
Jute	Pakistan, Bharat.
Meat	U.S.A., U.S.S.R., China.
Rice	China, Bharat, Japan.
Sugarcane	Cuba, Bharat, Japan, Pakistan.
Wheat	U.S.A., U.S.S.R.
Rubber	U.S.A., Malaya, French Indo-China.
Gold	South Africa, Australia, Canada, South America.
Silver	Mexico, U.S.A., Peru.
Copper	U.S.A., Chili.
Coal	U.S.A., U.K., Germany.
Petroleum	U.S.A., Iraq., U.S.S.R.
Steel	U.S.A., U.S.S.R., U.K.
Iron ore	U.S.A., U.S.S.R., U.K.
Tin	Bolivia, Malaya, Indonesia.
Coffee	Brazil, Columbia, Indonesia. Venezuela, British East Africa.
Diamond	Belgian Congo, Gold Coast. Union of South Africa, Angola, South West Africa.
Hides and Skins	Pakistan, South America, China.
Lead	U.S.A., Australia, Mexico, Canada, India.
Maize	U.S.A., Argentina, U.S.S.R.
Mercury	Spain, Italy, U.S.A., U.S.S.R.
Silk (Raw)	China, Japan.
Sui gas	Pakistan.
Tobacco	China, U.S.A., U.S.S.R.
Zinc	U.S.A., Australia, Canada, Mexico.

Sec. XXI. Capitals

Country	*Capital*	*Country*	*Capital*
Afghanistan	Kabul	Egypt	Cairo
Argentina	Buenos Aires	France	Paris
Australia	Canberra	Germany	Berlin
Austria	Vienna	Holland	Hague

Country	*Capital*	*Country*	*Capital*
Belgium	Brussels	Iraq	Baghdad
Bharat	Delhi	Iran	Tehran
Brazil	Rio-de-Janeiro	Japan	Tokyo
		Jordan	Amman
Britain	London	Pakistan	Islamabad
Bulgaria	Sofia	Saudi Arabia	Riyadh
Burma	Rangoon	Syria	Damascus
Canada	Ottawa	Tibet	Lhasa
Chine	Peking	Turkey	Ankara
		U.A.R.	Cairo
Chilc	Santiago	U.S.A.	Washington
Czechoslovakia	Prague	U.S.S.R.	Moscow

Sec. XXII. Important Cities

Afghanistan. Kabul.

Africa. Cape Town, Port Elizabeth, Johannesburg (Transvaal), Pretoria, Durban, Nairobi, Kenya Colony), Dar-es-Salaam. Fez (Morocco), Tunis (Tunisia) Algiers, Oran (Algeria), Tripoli, Benghazi, Leopoldville (Congo).

America. Washington, New York, San Francisco, Detroit, Chicago, Pittsburg, New Orleans, Los Angeles, Rio de-Janerio, Buenos Aires, Montivideo, Philadelphia.

Arabia. Mecca, Medina, Jeddah, Muscat, Aden.

Australia. Canberra, Melbourne, Sydney, Ipswich, Brisbane, Bathurst, Riverina, Darwin, Adelaide. Alice Springs, Geraldton.

Austria. Vienna, Eisenerz.

Belgium. Luxembourg, Brussels, Antwerp, Mons, Charbroi.

Bharat. Delhi, Calcutta, Bombay, Madras, Benares, Allahabad, Kanpur, Lucknow, Agra.

Bulgaria. Sofia, Varna.

Burma. Rangoon, Mandalay.

China. Peking, Shanghai, Canton, Hong Kong, Port Arthur, Tienstin, Cheng-tu, Chungking, Hankow, Harbin.

France. Paris, Marseilles, Mulhouse, Bordeaux, St. Etienne, Rouen, Rheims, Robaix.

Germany. Berlin.

Greece. Athens, Salonika.

Holland. The Hague, Ureche, Tilburge.

Hungary. Budapest, Szeged, Pear.

Iran. Tehran, Shiraz, Bushire, Bander Abbas, Isfahan, Hamadan, Meshed.

Israel. Tel-Aviv, Haifa, Jerusalem.

Italy. Rome, Naples, Milan, Genoa, Florence, Palermo.

Japan. Tokyo.

Jordan. Amman, Maan, Aqaba.

Lebanon. Beirut, Tripoli, Zahle, Sidon.

New Zealand. Aukland, New Plymouth, Invercargill.

Pakistan. Karachi, Dacca, Chittagong, Lahore, Peshawar, Hyderabad (Sind), Quetta, Multan, Lyallpur, Rawalpindi, Montgomery.

Rumania. Bucharest, Galatz.

Siam. Bangkok.

Spain & Portugal. Madrid, Gibraltar, Barcelona, Lisbon.

Switzerland. Geneva, Basil, Zurich, Berne.

Turkey. Ankara, Istanbul, (Constantinople), Adana, Erzurum, Bursa, Izmir, Edirne.

U.A.R. Cairo, Aswan, Port Said, Suez, Alexandria (Egypt); Damascus, Aleppo, Hama, Latakia (Syria); Sana (Yemen); Baghdad, Mosul, Basra (Iraq).

U.K. London, Liverpool, Manchester, Glasgow, Sheffield, Birmingham, New Castle, Leeds, Hull.

U.S.S.R. Moscow, Leningrad, Stalingrad, Vladivostok, Khakov, Kiev, Odessa, Omsk, Tamsk, Irkutsk.

Sec. XXIII. Countries of the World

Country	*Area (sq. m.) (Rounded to thousands)*	*Capital*	*Chief Exports*
Abyssinia	350,000	Addis Ababa	Coffee, hides and skins, livestock.
Afghanistan	250,000	Kabul	Spices, fruits, carpets and raw wool.
Albania	12,000	Tirana	Textile, coal, metal manufactures.
Arabia	10,00,000		Formerly the country was a single political unit but now it consists of Saudi Arabia, Kuwait, Amman, Aden, Hadhramaut, Bahrein Islands, Yemen and Muscat.
Arabia (Saudi)	60,000	Mecca (of Hejaz) Riyadh (of Nejd)	Dates, wool, horses.
Argentina	10,79,965	Buenos Aires	Meat, wool, wheat, maize.
Australia	2,97,581	Canberra	Wool, wheat, gold.
Austria	32,000	Vienna	Sugar, egg, woodwork.
Algeria	851,000	Algiers	Wine, olive oil, tobacco, minerals.
Belgium	12,000	Brussels	Coal, machinery, iron manufactures, linen.
Brazil	32,80,000	Rio-de-Janeiro	Coffee, rubber, cotton, sugar.
Britain	90,000	London	Machinery, vehicles, iron and steel manufactures, cotton goods, woollen goods.
Bulgaria	43,000	Sofia	Wheat, animals, scent of roses.
Burma	2,62,000	Rangoon	Rice, teak, *petroleum.*
California	1,57,000	Sacramento	Fruits, wheat, petroleum, gold.
Canada	38,13,000	Ottawa	Wheat timber, cheese, butter, cattle.
Ceylon	25,000	Colombo	*Tea, rubber*, rice, coconuts.
Chile	2,85,000	Santiago	*Minerals*, wool.
China	33,81,000	Peking	Animal products, raw cotton, raw silk, oil, spices, tea.
Columbia	44,000	Bogota	Coffee, tobacco, cocoa, minerals, rice.
Costa Rica	20,000	San Jose	Coffee, bananas, rubber, gold.
Cuba	44,000	Havana	Sugar, cigar, tobacco.
Czechoslovakia	49,000	Prague	*Sugar, glass*, timber.
Denmark	16,000	Copenhagen	*Butter, eggs*, meat.
Finland	1,35,000	Helsinki	*Paper*, timber, butter.
France	2,13,000	Paris	*Wines*, textiles.
Greece	51,000	Athens	*Currant*, wine, olive oil, fruit.
Germany	1,36,000	Berlin (W. Ger.)	*Sugar*, metal and wool manufactures.
		Bonn (East Ger.)	Textiles, coal, silk, paper.
Guatemala	45,000	Guatemala	Coffee, sugar, tobacco, minerals.
Holland (Netherlands)	13,000	The Hague Amsterdam	Butter, margarine, cheese.
Hungary	36,000	Budapest	*Wheat.*
Haiti	10,000	Port au Prince	Coffee, cocoa, cotton, tobacco.
Honduras	44,000	Tegucigalopa	Coffer, gold, silver, copper, iron.
Iceland	40,000	Reykjavik	Fish.
Ireland, Republic of Eire	26,600	..	
India	10,55,000	New Delhi	*Rice*, cotton, tea, hides, spices, textiles.
Indo-China (Viet-Nam).	2,86,000	Hanoi	*Rice.*
Iran (Persia)	6,28,000	Tehran	Petroleum, carpets, foodgrains, fruits.

Country	*Area (sq. m.) (Rounded to thousands)*	*Capital*	*Chief Exports*
Iraq	1,66,000	Baghdad	Dates, petroleum.
Israel	6,000	Tel Aviv	Livestock.
Italy	1,20,000	Rome	*Raw silk* manufactures, olive oil, hemp, flax, sulphur, wine.
Japan	1,48,000	Tokyo	Raw and manufactured, silks, cotton goods, coal, pottery, glassware, machinery.
Jordan	38,000	Amman	Wheat.
Korea North	46,000	Pronyang	
Korea South	37,000	Seoul	
Lebanon	4,000	Beirut	Wheat.
Liberia	43,000	Monrovia	Coffee, sugar, rubber.
Luxembourg	1,000	Luxembourg	Iron, steel, paper.
Libya	680,000	Tripoli	..
Malaya	51,000	Singapore	*Rubber, tin,* spices.
Mexico	7,64,000	Mexico City	Silver, lead, copper.
Morocco	1,72,000	Rabat	Fruit, cereals, livestock, minerals.
Malta	122	Valetta	..
Newfoundland	43,000	St. John's	Cod, oils, iron, ore.
Norway	1,25,000	Olso	Wood, and wood-pulp, fish.
New Zealand	1,04,000	Wellington	Wool, mutton, butter.
Nicaragua	57,000	Managua	Gold, silver, coffee, cocoa, sugar.
Nepal	54,000	Khatmandu	Cattle, hides and skin, opium and other drugs.
Pakistan	3,65,000	Islamabad	*Jute, cotton, wheat,* oilseeds, hides and skins,
Peru	4,82,000	Lima	Sugar, cotton, hides.
Philippine	12,000	Manila	Rice, gold, iron, coal, coffee, coconuts.
Poland	1,50,000	Warsaw	Grain, flax, timber.
Portugal	35,000	Lisbon	Wine, cork, fruit.
Rumania	92,000	Bucharest	Wheat, maize, fruit.
Russia'	63,11,000	Moscow	*Wheat,* eggs, timber, flax, textiles, furs.
South Africa	4,72,000	Cape Town and Pretoria	*Gold, wool,* diamonds.
Korea	85,000	Seoul (South Zone) and Pyongyang (North Zone)	
Siam (Thailand)	2,00,000	Bangkok	Rice, rubber, teak-wood.
Spain	1,95,000	Madrid	Ores of iron, *copper,* and lead, wine, fruit.
Sudan	9,68,000	Khartum	Cotton, gum arabic, and millets.
Sweden	1,73,000	Stockholm	Wood, and wood pulp, *iron ore,* animal produce.
Switzerland	16,000	Borne	Silk, cotton, clothes and watches, cheese, condensed milk.
Tibet	4,70,000	Lhasa	Borax, gold, salt.
Turkey	3,20,000	Ankara	Cereals, cotton, raisins, figs, olive oil, tobacco, carpets and wool.
Tunisia	48,000	Tunis	Dates.
U.S.A.	30,22,000	Washington	Aircraft, vehicles, machinery of all kinds, chemical, metals, cotton and tobacco manufactures etc.

Country	*Area (sq. m.) (Rounded to thousands)*	*Capital*	*Chief Exports*
U.A.R.	5,27,000	Cairo	Cotton, cottonseed, oilseed, cake, tobacco, wheat, grapes.
United States of Indonesia.	7,35,000	Jakarta	Tin and rubber.
Venezuela	3,52,000	Caracas	Petrol, rubber, cotton, tobacco, sugar, coffee.
Uruguay	72,000	Monteviodeo	Wheat, olives.
Yugoslavia	96,000	Belgrade	Grain, fruit, animals.

Sec. XXIV. The World's Great Waterfalls

(*a*) *In order of height (single leap only).*

Waterfall	*Country*	*River*	*Height (ft.)*
Angel Falls	Venezuela	Tributary of Carnoi River	3,212
Ribbon Falls	California U.S.A.	Tributary of Yosemite River	1,612
King George VI	British Guiana	Utshi River	1,600
Upper Yosemite	California, U.S.A.	Yosemite Creek	1,430
Tugela (highest fall)	Natal (S. Africa)	Tugela River	1,350
Gavarnie	Pyrenees, France	Gave de Pau	1,385
Wollomombi	New South Wales, Australia	Wollomombi River	1,100
Takakkaw	British Columbia, Canada	Tributary of Yoho River	1,000
Staubbach	Switzerland	Pletschen River	980
Mardola	Norway	Elkesdals Lake	974
Vettisfoss	Norway	Utla River	856
Chirombo	N. Rhodesia	Ieisa River	880
King Edward VIII	British Guiana	Semang River	840
Gersoppa	India	Sharavati River	830
Sutherland	New Zealand	Arthur River	815

(*b*) *In order of Volume.*

Waterfall	*Country*	*River*	*Height (H)*	*Average annual flow (cu. ft./sec.)*
Guaira or Sete Quedas	Brazil-Paraguay	Alto Parana River	130	47[illegible]0
Khon	Laos-Cambodia	Mekong River	70	410,000
Niagara	U.S.A.—Canada	Niagara River	167	212,000
Paolo Afonse	Brazil	Sao Francisco River	192	100,000
Urubupunga	Brazil	Alto Parana River	40	97,000
Iguazu	Argentina-Brazil	Iguazu River	237	61,660
Patos-Maribondo	Brazil	Rio Grande	115	53,000
Victoria	N. & S. Rhodesia	Zambesi River	354	38,430
Grand	Labrador	Hamilton River	245	35,000
Kaieteur	British Guiana	Potaro River	741	23,400

Sec. XXV. Important Straits of the World

Bering Strait separates America from Asia.

Palk Strait separates Ceylon from India.

Florida Strait separates Florida from Cuba.

Malacca Strait separates Sumatra from Malayan Peninsula.

Strait of Bosphorus connects the Black Sea with the Sea of Marmora.

Strait of Bonifacio separates Corsica from Sardinia.

Strait of Messina separates Sicily from Italy.

Strait of Dardanelles connects the Sea of Marmora with the Ægean Sea.

Strait of Dover connects the English Channel with the North Sea.

Strait of Gibraltar separates Spain from Africa.

Sunda Strait separates Java from Sumatra.

Sec. XXVI. Why are the following so called?

America is so called from Amerigo Vespucci, who in 1497 A.D. landed on the continent, south of the Equator.

Australia. Literally, it means "Southern Asia" where it lies.

Babelmandeb. Arabic word, means "The gate of tears". It was so called because numerous shipwrecks took place there. Strait separating Asia from Africa, only 15 miles wide and leading from the Indian Ocean to the Red Sea.

Baltic Sea (North Europe). Supposed to have derived its name from the belts by which it is entered.

Belgium derived its name from that of a tribe called Belgae.

Black Sea (Europe) is so called because of the dense fog that prevails there in winter.

Columbia (U.S.A.) is named after its founder, Columbus.

Equador is so called because it lies on the Equator.

France derives its name from Franks, a tribe which settled in the country at a very early period and gave it the present name.

Greenland. So called from the green moss growing on its shores.

Holland literally means 'hollow land'. The country is known after its principal province.

Hungary owes its name to the Huns.

Ireland. Name derived from a Gaelic word meaning "Western Island".

Marmora Sea. So called because of the famous marble (Marmor) island it contains.

Mediterranean. The ancients believed it to be situated in the middle of the earth.

Mesopotamia. Derived from two Greek words: *meso* meaning middle and *potanus*, a river and meaning the land between two rivers.

Mexico. So called from Mexitti, the god of war of the Azecas, a native race that dwelt in Mexico before the Spanish conquest.

Mount Everest after Sir George Everest, Surveyor of old India.

New Zealand. Dutch navigator named Tasman, discovered it in 1646 and named it after Zealand, a province of Holland.

Pakistan. Dr. Iqbal suggested that the Indian Muslims should have a separate state comprising of (*pey*) Punjab, (*alif*) Afghan (N.W.F.P.), (*kaaf*) Kashmir, (*seen*) Sind and (*taan*) Baluchistan.

Philippines was named after the Spanish King Philip II.

Queensland was named by Queen Victoria in 1859 when it was separated from New South Wales.

Siberia. It was supposed to have been so called for Siber, the capital of an old Tartar kingdom on the banks of Irish river's tributary of Obi.

Spain. The name is derived from its old name of Haspania (so called when it was a Muslim empire).

White Sea was so named from the ice and snow with which it is covered during the greater part of a year.

Washington was named after George Washington, the first President of the United States of America.

West Indies were so called by Columbus who reached there by sailing westwards and thought that they were some islands of India.

Sec. XXVII. Important Plains of the World.

(*i*) **Indo-Gangetic Plains** comprised of the plains of the river Indus, with the other five rivers of the Punjab and the Ganges river in erstwhile India. Now the Indus plain lies in the Punjab (Pakistan) and the Ganges plain in India (Bharat). Both the plains are very productive and one of the most thickly populated areas in the world.

(*ii*) **Lombardy Plains** are most fertile parts of Italy. They are watered by the river Po. They grow corn, fruits and mulberry plants over which silkworm is reared.

(*iii*) **Pampas** are the wide, treeless grass-covered plains of La Plata river system in S. America. They are the most extensive pasture lands in the world.

(*iv*) **Steppes** are vast, treeless plains of Russia extending from the Caspian Sea eastwards. They are very hot in summer and very cold in winter and have no rainfall.

(*v*) **Tundras** are the lowlands of the northern hemisphere south of Arctic coastline. In winter they are covered with ice and snow and in the summer with dwarfed shrubs, lichens and mosses, on which sub-Arctic animals like reindeer and musk oxen live. Fishing and hunting are the chief occupations of the people.

Sec. XXVIII. Important Canals of the World.

Suez Canal is the biggest ship canal of its kind. Ferdinand de Lessepps, French engineer, opened this canal in 1869. It was projected in 1852. Completed in 10 years at a cost of £2,00,00,000. The canal is 101 miles long with a minimum width of 147 ft. Suez Canal has shortened distance between

Bombay and England by 5,000 miles. Trade between Western Europe and Asia and Australia increased greatly.

Panama Canal was opened in 1914. It is 50 miles long, 500 feet wide and depth varies from 40 to 48 feet. The canal was dug by the United States Government to join the Atlantic and Pacific Oceans. It is not a sea level canal like Suez Canal; ships are raised to a height of some 85 feet by system of locks.

Kiel Canal is an important navigation canal built by the Germans. The canal connects the North Sea with the Baltic Sea. It is some 64 miles long and 40 feet deep.

The Grand Canal is 700 miles long. It was built in the seventh century. It lies between Peking and Hang-Chan and connects the Yangtse Kiang, Hwang-Ho and Peiho. The canal is the largest artificial waterway in the world.

Sec. XXIX. Principal World Sea Routes

1. **The Suez Canal Route** connects Africa, Arabia, Iran, Pakistan, India, Australia, China, Japan and other Middle and Far East countries with all the European and North Atlantic sea routes. The main seaports are London, Liverpool, Rotterdam, Marseilles, Naples, Aden, Karachi, Chittagong, Rangoon, Singapore, Hong Kong, Melbourne, Sydney, etc.

2. **Panama Route** connects the Pacific with the Atlantic. Colon, San Diego, Aukland and Calais are some of the main ports.

3. **North Atlantic Route.** By this route coast of North America is connected with Europe. Main ports are New-York, Boston, Montreal, Quebec, New Orleans, Liverpool, London, Rotterdam, Lisbon, etc.

4. **South Africa Route.** This is an alternative route from Western Europe to Far East. It also connects South Africa with Western Europe. London, Liverpool, Lisbon, Cape Town, Melbourne, Sydney, etc. are some of the main ports on this route.

5. **The Pacific Route** connects New Zealand, Australia, China and Japan with the U.S.A. and Canada.

6. **The South Atlantic and West Indies Route.** It

connects West Indies, Brazil and Argentina, Havana, Tompica, Bohia, Rio-de-Janeiro, Buenos Aires, are chief ports.

Sec. XXX. World Air Routes

1. Airways connecting Europe, Asia and Australia. Chief ports are London, Marseilles, Athens, Alexandria, Cairo, Baghdad, Karachi, Jodhpur, Delhi, Allahabad, Calcutta, Rangoon, Singapore, Jakarta, Sydney, Melbourne.

2. Airlines connecting Asia and Australia.

3. Airlines between Europe and America follow the American Atlantic coast up to Dakkar. From there they cross the Atlantic Ocean and reach Pernambuco (in Brazil). All the routes of U.S.A. are connected to Pernambuco.

4. Air route between America and Asia starts from San Francisco and goes across the Pacific *via* Honolulu, Wake Islands and Manila to Canton.

CHAPTER 4

AGRICULTURE AND IMPORTANT CROPS

Man and Agriculture. We do not quite know when and how man began to cultivate land for his food and other necessaries of life. A region in which man practised agriculture thousands of years ago, is the Nile Valley. Probably the first people who lived there were pastoral people keeping goats and cattle. They also hunted the deer and antelope on the lands by the river and hippopotamus in the river itself. Moreover, on the ground, by the riverside, which was moistened by the annual flooding, abundant vegetation grew, including the date-palm. Probably, it was not in this valley itself that man first learnt to grow the plants he needed. Lesson was probably first learnt elsewhere but repeated there with great ease and great reward. Nature was favourable and these active-minded men succeeded, step by step, in making the valley fertile.

Another region almost exactly like this was the flood plain of the Tigris and Euphrates. Here, too, a great civilization arose mainly in the lower part of the flood plain and the delta; this region was Babylonia. Both here and in Egypt people learnt how to take the river water to lands, which without it would have been barren.

A third region of early civilization was the great plain and valley of China. But this was so shut off from the rest of the old world by mountains and deserts that it remained without much change for a very long period and has only recently been brought into touch with other lands.

In the course of time, the Greeks, the Romans and other peoples continued to develop the methods of agriculture. In recent times the scientific research has developed agricultural science to a considerable extent. Nearly all progressive countries have set up Agricultural Colleges, Research Institutes, and experimental farms to promote this industry. Quality seeds are distributed, artificial fertilisers are introduced and

ways and means are explored to eradicate pests and increase and improve production. Invention of improved drills, motor ploughs, motor reapers and combined harvesters has revolutionized agriculture.

Rotation of Crops means the varying of the crops year by year such that no piece of land is planted in successive year with crops requiring the same kind of food. It is observed that if the same plants are grown year after year on the same soil, their yield becomes poor. This is so because the plants use up some particular kind of food which they require from the soil. As for example, wheat requires a good deal of nitrogen, but the soil obtains fresh supplies of this from the air very slowly, so that if wheat is grown in the same field each year, the supply of nitrogen runs short, the wheat gets less than it requires and so the farmer obtains a poor yield. Therefore, unless he is able to put on the field manures, which supply fresh nitrogen, he finds it best to sow wheat in turn with other crops which do not take so much nitrogen from the soil, and frequently he gives the field a year's rest and allows it to lie fallow while it gets more nitrogen from the air. A farmer may sow wheat in the first year, in the next year rootcrops (say turnips) and in the third year grasses or clover and then let the ground lie fallow before sowing wheat. This is what we call rotation of crops and in most parts of the world farmers employ some kind of rotation of crops. In order to get maximum benefit, the rotation should be done in the best possible way.

Only in very fertile lands, which have just been taken into cultivation, farmers are able to grow the same kind of crop year after year without any loss.

Crop-rotation keeps soil fertile because some crops add to the salts exhausted by other crops. It keeps down harmful weeds. It provides a basis for animal rearing when fodder crops and grass come in rotation with food or cash crops.

Wheat is a grass. It grows just like any other grass and sends out stalk. Wheat plant requires a cool climate at the time of ripening. It requires a moderate rainfall and that too at intervals. A little rain, just before the grain ripens, is useful, because it helps the grain to swell. Stiff and clayey soil

and level ground are especially favourable for wheat crop. Much heat and great moisture are injurious to its growth. It flourishes well in the temperate grasslands and in the Mediterranean climate.

It is a great advantage that wheat is grown in so many different regions, for if the weather is bad in one area, and the harvest fails, yet in other areas the weather may be good and the yield abundant. It is very unlikely that in the same year very bad weather would be found in several such widely separated regions. Also the harvest comes at quite different times in different countries: for example, in the countries of the southern hemisphere the harvest is in their winter months of November, December and January; in Pakistan and Bharat it is at the end of the winter in March and April; in the Mediterranean region it is in the spring and early summer months of April, May and June; in Central Europe and North America it is in the later summer months of July and August; while in North Europe, where the crops have to remain in the ground much longer to make up for the lower temperatures, the wheat ripens in September or even in October.

The principal wheat-producing countries of the world are Russia, U.S.A., Canada, Pakistan, Bharat, France, Italy, Argentina, Australia, Spain, Germany, Rumania, Hungary and New Zealand.

In Pakistan and Bharat, wheat is grown during the winter, sown in October and mown in April, for then the heat is about the same as that of the temperate grasslands in summer; as the winter is the dry season, much of water has to be supplied by canals and wells.

Rice. In warmer regions rice forms the chief food. Rice requires much heat and a great deal of moisture and it is generally produced in low lands which are flooded either by the great summer rains or by water from rivers or canals. The low coastal districts of the monsoon regions extending from Pakistan to Japan are, therefore, the greatest rice producing areas. Rice nourishes well in the river deltas and alluvial plains which can be easily flooded. The annually flooded delta of Egypt and the low plains of Lombardy are the chief areas of production in the Mediterranean region, while in the New World the most important areas are the

south-east coastal regions with the Lower Amazon Valley in South America. In Pakistan, rice is grown mainly in East Bengal, and parts of West Pakistan. In Bharat, it is grown in West Bengal, Bihar, Assam and deltas of Deccan rivers.

Maize requires a warm and moist climate but none so moist as rice or sugarcane. It requires comparatively a higher temperature than wheat, and as such the regions of greatest production of maize are rather nearer the Equator than the greatest wheat producing regions. Maize is indigenous to America, but at present it is being cultivated in several countries. The chief countries growing it are the U.S.A.; Argentina, Rumania, South Russia, Yugoslavia, Brazil, Italy, Austria, Hungary, South Africa, West Pakistan, Bharat (U.P., Bihar) and Mexico.

Barley is grown in almost the same regions as wheat, although it is rather more hardy and can be grown in somewhat cooler and drier areas and also in poorer soils than wheat. It is used as food or for making beer. The greatest quantity is grown in Russia and this country is followed by Germany, the United States and Austria. In Pakistan, it is grown in parts both in West Pakistan and East Pakistan. In Bharat, it is grown in the U.P.

Sugar. Sugarcane is another important produce of the countries which produce rice and cotton. The canes grow up from the same roots each year. But in places where soil is not sufficiently fertile, sugarcane has to be sown afresh each year. They are cut and pressed between rollers to obtain the juice, and from this the sugar as also molasses (or treacle) and rum are obtained. Sugarcane requires a hot, moist climate with moderate rainfall and a fertile soil. It is a tropical and subtropical plant. Salt in the soil or in the air is very useful to it. That is why sugarcane is helped by sea breezes.

Cuba in the West Indies produces the greatest quantity of sugarcane. Java, Indonesia and India come next. The other chief sugarcane producing countries are Brazil, Pakistan, China, delta of the Mississippi (U.S.A.)., Queensland (Australia), Natal. In Pakistan, sugarcane is greatly obtained in parts of West Pakistan and East Pakistan.

Not only the sugarcane but many other plants also store

sugar and of these the *sugar-beet* grown in temperate regions is important. Sugar-beet is something like a turnip and grows annually in the temperate regions from seed. In soft soils, roots develop properly and grow big with juice. The roots are cut into small pieces and dissolved in water to extract the juice. The pieces of roots are pressed together and serve as cattle food, and from the juice both sugar and alcohol are prepared. The chief sugar-beet producing countries are Russia, Germany, U.S.A., France, Austria, Poland and Belgium. Now it is also cultivated in Iran.

Cotton is obtained from many of the same countries which produce rice, but it does not require so much water and it is, therefore, grown in areas with less rain or on rather higher ground. Cotton requires a fertile soil that can retain moisture. It can grow on a variety of soils if they are regularly manured. Lava soil, limestone soils or rich sandy loams are best suited to it. The chief cotton producing countries of the world are the U.S.A., Pakistan, Egypt, Bharat, China, Russia, Turkistan, Japan and the Sudan. The U.S.A. alone produces more than half the total supply of cotton in the world. Queensland (Australia), Uganda (East Africa), Iraq and Turkey also grow cotton.

In Pakistan cotton is mainly grown in parts of West Pakistan. The land irrigated by a vast network of Irrigation canals is famous for cotton production.

Jute requires a hot and moist climate and a rich soil. It weakens the soil and hence the soil where it is cultivared must be renewed every year. Jute is used in making gunny-bags, canvas, etc.

It is principally grown in Bengal and Assam. East Pakistan enjoys the world monopoly in the produce of jute and produces some seventy per cent of the world jute. It flourishes in the lower basin of the rivers in East Pakistan. Here the rivers deposit new soil every year. The chief port for its export is Chittagong.

Tea. It is the dry leaves of an evergreen tree or shrub, and makes a stimulating drink. In cultivation the tree is kept five or six feet high so that the leaves can be picked by hand. Tea is a product of those parts of the monsoon lands which

have some rain in winter as well as in summer. These regions have considerable heat and rain during the summer, but as tea plant grows on the hillside up to a height of about 6,000 feet, the actual heat received is not excessive, and similarly, although much rain falls, the water soon drains from the hill slopes, and the roots are not harmed. Frequent rainfalls in showers help in the growth of soft leaves.

China was the first country to grow tea, but later on it came to be planted and grown in even greater quantities in India, Ceylon, Java, Japan, Natal, Indonesia, Burma and Africa.

In Pakistan, it is mainly grown in upper parts of East Bengal. In Bharat, it is grown in upper Assam, Nilgiri Hills (Madras), Dehra Dun (U.P.), etc.

Coffee is a tropical plant and bears a berry-like fruit which is boiled to make a coffee drink. Like tea plant, it is kept about six feet high and grows best on hill tops. The trees are planted in rows, and to protect them from direct sunshine, other shady trees are grown between the rows. It requires a warm, moist climate, a rich soil and an altitude of 1,500 to 2,500 feet. The coffee plant cannot stand great cold, hence its cultivation is confined to the tropics. It is chiefly produced in Brazil, Columbia, Indonesia, Central America, Mexico, West Indies, Arabia, South India and Ceylon.

CHAPTER 5

GAZETTEER OF THE WORLD

Aland Islands. A group of several hundred islands and islets in the northern Baltic, half-way between Sweden and Finland. The islands are of high strategic importance.

Abadan. A town in Iran, famous for its oil refineries.

Abbottabad. Headquarters of the Hazara District in West Pakistan. It is also a hill station.

Aberdeen. Principal seaport of Scotland. It is also known as "The Granite City."

Abyssinia. Official name Ethiopia, in East Africa. Annexed by Italy before World War II. Again occupied by Haile Sellasie, the Abyssinian Emperor in 1941.

Acra is a famous city and seaport of Syria.

Adam's Bridge is a narrow strip of sea situated between India and Ceylon.

Adam's Peak is a sacred mountain situated in South Ceylon.

Addis Ababa. Abyssinia's capital.

Adelaide is capital of South Australia. It is one of the most attractive cities in the world.

Aden is a British fortified seaport on the Arabian coast. It is on the entrance to the Red Sea.

AEgean Sea lies between Greece and Asia Minor. It is a part of the Mediterranean.

Afghanistan. Central Asiatic Kingdom situated to the north of Pakistan. Important as a buffer state between Pakistan and Russia.

Agra. A famous town in the Utter Pradesh (India). Famous for the magnificent Taj Mahal built by the Mughal Emperor Shah Jahan.

Aix-la-Chapelle. City of Prussia (Germany), famous for its baths.

Aix-la-Bains. In France, a fashionable resort and famous for baccarat play and sulphur baths.

Ajanta. In Hyderabad, Deccan, is famous for its ancient caves and sculpture work.

Akyab. A seaport of Burma.

Alaska. A territory of the U.S.A. Northernmost part of America.

Albania. A Muslim country in Europe.

Albert-Nyanza. Lake in Africa.

Aleppo. Chief trade centre and city of Syria.

Alexandretta. Famous port of Syria.

Alexandria is chief port of Egypt, was founded by Alexander the Great in 332 B.C.

Algeria is a province of North Africa and famous for wine.

Algiers. Seaports of Algeria; of strategic importance

Aligarh. (India, U.P.) Seat of the Muslim University, founded by Sir Sayyed Ahmad Khan.

Allahabad. Capital of the Utter Pradesh (India).

Almora. A hill-station in the U. P. (India).

Alps. Highest mountains of Europe, with Mount Blanc as the principal peak.

Alsace-Lorraine. A province of Eastern France, famous for its large iron ore deposits. It was captured by Germany in 1870-71. France reoccupied it after the World War I, but Germany again snatched it in 1940 (during World War II). 'Liberated' in 1944.

Altai. A famous mountain range of Central Asia.

Amazon River (South America). Has the largest basin of all the world.

Amritsar. Holy city of the Sikhs in the Punjab (India) with Golden Temple.

Amsterdam is capital of Holland. It is built on 96 islands joined by bridges.

Andamans. Island in the Bay of Bengal. Penalsettlement for Indian convicts.

Andes is great mountain system of South America.

Angora (Ankara). Capital of Turkey.

Annam. Eastern part of French Indo-China, now a unit of Viet-Nam

Ararat (Mountain). In Armenia, supposed to be the resting place of Noah's Ark.

Armenia. Lies between the Caucasus, the Caspian and Asia Minor. Now; it is a Republic of the U.S.S.R.

Asansol. In West Bengal, centre of coal industry.

Athens. Capital city of Greece. Most renowned centre of ancient Greek art and learning.

Atlas (North Africa). Great range of mountains.

Attock (West Pakistan). A town in West Pakistan, has an excellent bridge over the river Indus and is famous for its oil-wells.

Aukland. Largest city of New Zealand, and an important seaport.

Ava Bridge is on the river Irrawaddy in Burma.

Azores. Portuguese island situated in Mid-Atlantic.

Babel-Mandeb. A strait which unites Arabian Sea with Red Sea. It is also known as "Gate of Tears."

Babylon. Capital of ancient Babylonian Empire.

Baghdad. Capital of Iraq, situated on the river Tigris. It is also an important airport on London-Karachi air-route.

Bahamas. A chain of islands occupied by the British in West Indies.

Bahrein. A group of islands in the Persian Gulf, famous for pearl fisheries and oil and an important air port on Croydon-Karachi route.

Baku (Russia). Situated on Caspian Sea. Famous for petroleum.

Balearic Islands. A group of islands in the Mediterranean.

Balkans. A mountain range lying between the Danube and the Ægean Sea.

Balkh. City of Afghan Turkistan. Famous in antiquity and called the "Mother of Cities."

Balmoral. The residence of the British King in Scotland.

Baltic. Sea lying between Russia and Scandinavia.

Baltimore. A famous port lying on the sea coast of North America.

Bundar Abbas is a seaport of Iran.

Bangalore (India). Capital of Mysore State. Famous for its silk factories.

Bangkok. Capital of Siam. A good port, "Venice of the East."

Bannu. (West Pakistan). An important military station.

Barcelona. An important seaport of Spain.

Basra. Port of Iraq. Famous for its dates.

Basle. Swiss city famous for its silk goods.

Batavia. Seaport and capital of Java.

Bath. Town in England, famous for its hot springs and Roman ruins.

Batum. Seaport on the Black Sea. Exports oil.

Bavaria. A free state in Germany. Capital is Munich.

Bear Lake, Great. In Canada.

Bering Strait. Separates Asia (Siberia) from North America (Alaska).

Belfast. Seaport. Largest city in northern Ireland. Famous for linen manufacture and shipbuilding.

Belgian Congo. A small free state in Africa.

Belgrade. Capital of Yugoslavia.

Benghazi is a seaport of N. Africa.

Ben Nevis. A mountain in Scotland, highest in the British Isles (4,400 ft.).

Bergen. Seaport and the most important city of Norway.

Bessarbia. A province of Rumania.

Berlin. Capital of Germany, one of the greatest cities.

Berne. Capital of Switzerland.

Bethlehem. In Palestine, birthplace of Lord Christ.

Beirut. Seaport on Lebanon coast. Capital of Lebanon.

Bhutan. An independent state in Eastern Himalayas.

Birmingham. An important industrial town in England, famous for its metal manufactures such as cutlery.

Biscay, Bay of. Lies west of France and north of Spain. It is a stormy part of the Atlantic Ocean.

Bitter Lakes are situated in the Isthmus of Suez.

Blackburn. An English industrial town.

Black Country. South Straffordshire is called Black Country because of coal mines.

Black Forest is a mountainous region of Germany. A favourite holiday resort.

Black Hills. A range of hills in Wales (Great Britain).

Black Sea. The sea between Europe and Asia.

Black Mountain. Highest of the Alps, dividing Italy and France.

Blue Nile. River flowing from Abyssinia in Egypt. Joining the White Nile at Khartoum.

Bohemia. A part of Czechoslovakia.

Bokhara is a province and town of Russia.

Bolan pass is in the mountains of West Pakistan.

Bologne. A French port.

Bombay. Seaport of Bharat and an important centre of cotton industry.

Bordeaux is a seaport of France.

Borneo. Largest island in the East Indies.

Bosphorus. Strait between Black Sea and Sea of Marmora. It separates Asia Minor from Europe.

Boston is a seaport and capital of Massachusetts (U.S.A.).

Brahmputra. Great river falling in the Bay of Bengal.

Brazil. A state in South America.

Brest. A French naval station in Brittany.

Brisbane. An important Australian city and port.

Bristol. A port in west England.

British Guiana is situated on the north coast of South America.

British West Indies. Comprise of Bahamas, Barbados, Jamaica, Leeward Islands, Trinidad and Windward Island.

Broken Hill (Australia). Famous for the richest deposits of lead and silver ore in the world.

Brooklands. Motor racing track in Surrey.

Brussels. Capital of Belgium, is of great industrial importance.

Bucharest. Capital of Rumania in Europe.

Budapest. Capital of Hungary. Buda lies on the right and Pest on the left bank of the Danube.

Buenos Aires. Capital of Argentina and the largest city in South America.

Bushire. Seaport of Iran.

Cadiz. Seaport in Spain. One of the oldest seaports.

Calais. French seaport, nearest to England.

Cairo. Capital of Egypt.

Calcutta. (West Bengal). Largest city of Bharat.

California. A state of U.S.A.. Film industry (at Hollywood). Famous for beautiful scenery and minerals.

Cambay, Gulf of. Separates the Bombay province from Kathiawar.

Cambridge (England). Famous University.

Canberra. Federal capital of Australia.

Canton. A seaport and chief city of China.

Cape Horn is southernmost point of South America.

Cape of Good Hope. A cape or headland in South Africa.

Cape Town (South Africa). Capital of Cape province.

Cape Trafalgar. On the coast of Spain, near Cadiz.

Carribean Sea. Part of Atlantic Oceanbetween West Indies and Central America.

Casabianca. A seaport of Morocco.

Caspian Sea. Great salt lake, lies between Asia and Europe. World's largest inland body of water.

Caucasus. Mountain range lying between Caspian and Black Seas.

Celebes. An island in Indonesia.

Chandraghona (East Pakistan). Known for Karnaphuli Paper Mills.

Cherrapoonji. In Assam. Wettest place in the world with about 426 inches of annual rainfall.

Chicago. A city of the U.S.A. It is the greatest grain and meat market in the world.

China Sea lies between Korea and Philippines.

Chittagong. A town and port of East Pakistan. A great trade centre and seaport. Now, it is being developed as a first-class port.

Chunking. An important town in China.

Clyde. A river and firth in south-west Scotland.

Cocos Islands is a group of coral islands in the Indian Ocean.

Cologne. A great commercial town in Germany on the Rhine.

Colombo. Capital and port of Ceylon. Great coaling station of strategic importance.

Colon is a town and port in the Republic of Panama.

Columbia. A Republic in South America.

Coolgardie (West Australia). A gold mining town.

Congo. A river in Africa with the greatest drainage area.

Constantinople (Istanbul). City of Turkey. Has Sofia Mosque which is world's wonder.

Copenhagen. Port and capital of Denmark.

Corsica is a French island in the Mediterranean. Birthplace of Napoleon.

Costa Rica. A small Republic of Central America.

Crete. An island in the Mediterranean.

Crimea is a Republic of U.S.S.R.

Croydon. A famous airport of England, near London.

Cuba. A West Indies island, known for cigars and sugar.

Cyprus. British island of great strategic importance in the Eastern Mediterranean.

Dacca. Capital of East Pakistan, important industrial town and seat of University. Famous for its fine quality of muslin in olden days.

Damascus. Capital of Syria (U.A.R.).

Danube River is the second largest river in Europe.

Danzig. Free city and port of the Baltic Sea. Now forms a part of Poland.

Dardanelles. A strait between Europe and Turkey in Eastern Mediterranean.

Dar-es-Salaam. Seaport and capital of Tanganyika (E. Africa).

Darjeeling. Health resort in West Bengal.

Darling River. A river of New South Wales (Australia), so called because of its majestic and calm flow.

Darwin. Airport and seaport on the north coast of Australia.

Dead Sea. Salt-water lake in Palestine. It is 1,292 feet below sea-level.

Delhi. Capital of India (now Bharat). Famous for its antiquities and Mughul builaings.

Dera Ismail Khan. Headquarters of Dera Ismail Khan Division in West Pakistan, commands the Gomal Pass.

Derby. City of Great Britain, associated with "Derby race".

Detroit. A city in U.S.A., having the finest and biggest masonic temple in the world and is famous for Ford motor car.

Dodecanese Islands. Heavily fortified islands barring

the way to the Dardanelles. The islands include Rhodes, Leros and Cos.

Dover. Seaport and market town in Great Britain. Nearest point to France.

Dublin. Capital of Eire.

Dum Dum. Town and Cantonment of West Bengal. Aerodrome for Calcutta. Known for ammunition factory.

Dundee. A city and seaport of Great Britain, known for jute and linen manufactures.

Dunkirk. A strong port and good harbour to the north of France. The Allies were routed here in 1940 in the Battle of Flanders.

Durban. A port of Natal in South Africa.

East London. A port in South Africa.

Ecuador. A Republic in South America.

Edge Hill. A hill in the Midlands (England).

Edinburgh. Capital of Scotland. Known for its university.

Elba. An island in the Mediterranean, where Napoleon lived during his exile.

Elba. A river in Germany.

Elephanta. An island in Bombay harbour.

El Kuds or Jerusalem in Palestine.

Ellora. A town in Hyderabad, noted for its ancient sculptured cave temples.

Epsom. Famous race course in Surrey, England.

Eritrea. Italian territory along the west shore of Red Sea.

Estonia. Small Baltic state, lies to the south of the Gulf of Finland.

Euphrates. A large river of great historic importance, flowing through Iraq and falling in the Persian Gulf.

Fatehpur Sikri. A town founded by Akbar the Great, near Agra, contains magnificent remains of old Palace and Fort.

Falkland Isles. British colony in South Atlantic.

Fez. A city in Morocco, North Africa. Noted for its red caps.

Fiji Isles. A group of 240 islands in the South Pacific.

Florence. A city in Italy, noted for its beautiful buildings and galleries.

Flanders. A coastal territory of Belgium near the German-French border.

Florida. A peninsula and state of the U.S.A. It borders the Gulf of Mexico.

Formosa. Island off the Chinese coast. The only territory under K.M.T. and free from the Reds.

Gambia. A British colony on Guinea Coast of Africa.

Genoa. The famous city and seaport of Italy, well-known for its palaces.

Geneva (Switzerland). Formerly headquarters of the League of Nations.

Ghazni. An important, fortified town in Afghanistan.

Gibraltar. Fortress and town situated on a rock at the mouth of the Mediterranean. Heavily fortified British naval base. It is also known as "Key to the Mediterranean".

Gilgit. In Kashmir, commands the passes of the Hindukush.

Glasgow. Second largest city in Great Britain. An important shipbuilding and boiler manufacturing centre.

Goa. It lies on west coast of India.

Godwin Austin (Himalayas). Highest peak of the Korakoram Range. Also called K2.

Golden Gate. The narrow channel which leads to the bay of San Francisco (U.S.A.)

Golden Horn. Peninsula on the Bosphorus, from the harbour of Istanbul (Constantinople).

Gothenburg (Sweden). Chief port.

Greenland. One of the largest islands in the world in N. Atlantic Ocean, covered with snow during a greater part of the year.

Greenwich. Borough of London. Noted for its observatory. Standard time is reckoned from here.

Giwader. A Pakistan port situated on the Mekran coast 300 miles west of Karachi and about 45 miles from Iran-Pakistan border. It came into Pakistan sovereignty in September 1958 after being transferred by the Sultan of Muscat and Oman in whose sovereignty it remained for 170 years.

Hague, The. Holland's capital and seat of International Court of Justice.

Haifa. Seaport of Palestine. Iraq Petroleum Company's pipeline terminates here.

Haiti. A small Central American territory composed of two negro Republics. Also called Hispanolia.

Hamburg. The chief port of Germany.

Hankow. Chinese seaport. Now under Red occupation.

Hanover. A town in South Germany.

Harappa. A town of excavations in Montgomery District, Multan Division of West Pakistan.

Havana. Capital of Cuba, known for cigarettes.

Heligoland. An island in the North Sea.

Herat. A strongly fortified city in Afghanistan.

Hiroshima. Seaport of Japan. Scene of U.S.A. atom bomb attack.

Hollywood. The chief centre of motion-picture industry in the suburb of Los Angeles (San Francisco in U.S.A.).

Honduras. (Central America). A British colony.

Hong Kong. British island off China. One of the largest ports in the world. A strongly fortified naval base.

Honolulu. Capital of Hawaii Islands in the Pacific Ocean, under U.S.A's control.

Hwang Ho. A river in China well known for its devastating floods. Also called "China's Sorrow".

Hyde Park (London). A well-kno n park with a garden riding course, called "Rotten Row" and an artificial lake for boating and swimming.

Indus. The great River in West Pakistan.

Ionian Sea. Part of the Mediterranean, between Italy on the west and Greece on the east.

Iron Gate. A great gorge in Rumania, the Danube passes through it.

Islamabad (near Rawalpindi). New Capital of Pakistan.

Ivory Coast. It is a district of West Africa.

Jacobabad. Town in Khairpur Division of West Pakistan, the hottest place in Asia, temperature rising up to 128° in summer.

Jaffa is a seaport of Palestine.

Jamaica is a British island in the West Indies.

Jerusalem. The holy city of Palestine. "City of Peace" of Jesus with great historic associations. Now-a-days half of it is under Israeli Government.

Johannesburg. Town in Transvaal (South Africa). Famous for its mines.

Jordan River. It falls in the Dead Sea. Its course lies mostly below sea-level.

Jutland. Peninsula of Denmark. S ne of many important battles.

Kabul. Capital of Afghanistan. Famous for dry fruits.

Kaffiristan. Country lying between Chitral and Afghanistan, inhabited by an Afghan tribe called Kaffirs.

Kalahari Desert. A great desert lying in South Central Africa.

Kalgoorlie. Well-known gold-field in Western Australia.

Kanchenjunga. Wold's third highest peak (28,150 ft.) situated in the Himalayas.

Kandhar. City of Afghanistan. Historical place.

Kandy. Town in Ceylon. Famous for its beauty. Buddhist Temple of Tooth and its Tomb and a fine botanical garden.

Kansas City. In U.S.A. a city and a state. America's loveliest city after Chicago. A holiday resort.

Karachi. City and seaport of Pakistan. A thriving trade centre. Has an up-to-date airport situated on many important world air-routes.

Kashghar. It is a commercial city of Chinese Turkistan.

Kenilworth. A town with a ruined castle in Warwickshire.

Kerbala. The place of martyrdom of Imam Hussain (may God be pleased with him) in Iraq. A place of pilgrimage for the Shia Muslims.

Khatmandu. It is capital of Nepal State.

Khyber. Famous mountain pass between Pakistan and Afghanistan, through which India was invaded by Muslims. It is about 33 miles long.

Khartoum. Capital of Sudan.

Kiel. Town and seaport of Germany, situated at the end of Kiel Canal—an important German waterway.

Kiev. A big town in the Steppes (Russia). Known as grain-producing and mining centre.

Kimberley. Centre of diamond mining. A district in South Africa.

Kohi Baba Mountains. Situated in Afghanistan.

Kolar (Mysore State). Gold-mining centre.

K 2 (see **Godwin Austin**). This is the second highest mountain in the world.

Kurdistan. A district of Asia Minor, under the Turkish Republic.

Kurile Isles. Small rocky islands in the North Pacific, under Russia.

Labrador. Peninsula in East Canada, having famous fisheries.

Laccadives. Coral islands off Malabar coast in Arabian Sea.

Laddakh. Province of upper Indus in Kashmir. Great trading centre.

Lahore. Capital of West Pakistan. "A city of colleges", ancient and modern buildings. One of the most important cities of Pakistan. It proved itself to be the Stalingrad of Pakistan during the seventeen-day (Sept. 1965) Indo-Pak War.

Lake District. Mountainous district in England, noted for its beautiful scenery.

Lancashire. Famous cotton textile manufacturing centre in England.

Land's End. Extreme south-west point of Cornwall (in England) on the Atlantic Ocean.

La Paz is capital of Bolivia.

Latvia. A small Baltic State.

La Plata is a river of Argentina.

Lebanon is a Republic along the Eastern Mediterranean. It is famous for beautiful mountain scenery.

Leeds. English city noted for woollen manufactures. Seat of University.

Leh. Capital of Laddakh (Kashmir).

Leningrad. City and seaport of Russia. Formerly called St. Petersburg. Successfully resisted German attacks during World War II.

Levant. French and Italian name for east coast of the Mediterranean.

Leeward. Islands situated in West Indies.

Lhasa is capital of Tibet.

Libya (North Africa). Formerly called Tripoli; desert country.

Lima is capital of Peru.

Lisbon. Capital and a seaport of Portugal.

Lithuania is a small Baltic State.

Little Russia is a port of the Ukraine.

Liverpool. Famous port of England, exports cotton textiles.

Locarno. A Swiss resort situated near Italian frontier.

Loire. The largest river of France.

London. Largest city of the world. Capital of England and British Empire. It is full of art galleries, museums, theatres, historic buildings and notable markets.

Long Island. A part of the New York State, thickly populated and has many holiday resorts.

Lorraine. See Alsace Lorraine.

Los Angeles (U.S.A.) City of California. It is world famous film-producing centre.

Luxembourg. A small state to the south of Belgium.

Lyons. One of the greatest centres of silk industry in France.

Macedonia. Seat of a great empire founded by Alexander the Great in ancient days; now divided between Yugoslavia, Greece and Bulgaria.

Mackenzie. A river in Canada.

Madagascar. A big island situated to the south-east of Africa, famous for rubber and hides.

Madras. An artificial harbour and capital city of Madras Presidency.

Madrid is capital of Spain.

Magellan, Strait of. Arm of the sea, linking the Atlantic and Pacific Oceans. It is between Chile (South America) and Tierra del Fuego.

Maginot Line. A line of defence consisting of fortified underground defence, along the eastern border of France, planned by General Maginot, but proved ineffective when attacked by Germans in 1940.

Malacca, Strait of. It separates Sumatra from Malaya.

Malta. British island of great strategic importance in the Mediterranean. Strongly fortified, arsenal, dockyard and military station.

Maldive Isles is a group of coral islands in the Indian Ocean.

Man, Isle of. An island in the Irish Sea.

Manchester. City of Lancashire, England. A great manufacturing centre of cotton goods.

Mandalay. Former capital and an important city of Burma.

Manila. Heavily fortified capital and seaport of Philippine Islands.

Marseilles. A seaport of France on the Mediterrancan.

Marmora, Sea of. Lies between Asia and Europe. Connects Black Sea with the Strait of Bosphorus and the Ægean with the Strait of Dardanelles.

Marshall Islands is a group of islands in the N. Pacific.

Mauritius. Island in the Indian Ocean, famous for sugar industry.

Mecca. Birth-place of Muhammad (may peace be upon him), the Holy Prophet of Islam. Most sacred city for the Muslims. They go there for pilgrimage every year. Commercial centre of Arabia.

Medina. The sacred city of Islam; contains Masjid-i-Nabavi and tomb of the Holy Prophet.

Medicine Hat. City of south-coast Alberta in Canada. It is one of the largest natural gas fields in the world industries, coal-mining, cattle and sheep grazing, small farming.

The area of high pressure of North America is hereabouts, storms originating in the region cross the United States south-east and north-east and are described as coming from under Medicine Hat.

Melbourne. Capital city of Victoria, Australia; of great industrial importance.

Mersa Metruh (Egypt). Town off the Mediterranean coast.

Mesopotamia. Area irrigated by the Euphrates and the Tigris. Now forms part of Iraq.

Mexico. Capital city of the Mexico Republic. Rich in silver deposits.

Milan. Second largest city of Italy, famous for artistic buildings, art galleries and cathedrals. An important silk producing centre.

Mississippi, River. The longest river in North America, noted well for its floods and fertilising qualities.

Mohenjo-Daro. Site of excavations in West Pakistan. Many notable monuments of ancient civilization have been found there.

Molaccas (also called Spice Islands). Islands in Indonesia.

Mombasa. An important British port in East Africa.

Monte Cristo. An Italian island.

Montreal. Largest city in Canada, noted for its cotton, leather and timber factories.

Morocco. State of North Africa, famous for leather manufactures.

Mozambique is a Portuguese colony of East Africa.

Moscow. Capital of the U.S.S.R., full of historical interests, contains numerous famous buildings.

Mosul. City of Iraq, famous for its rich oil-wells.

Moulmein is a port of Burma.

Munich (in Germany). Known for Munich Agreement (1939) by which Czechoslovakia was dismembered.

Murree. An important hill station in West Pakistan A health resort.

Naples (Italy). City and seaport with beautiful scenery. Situated near the base of Vesuius and the ruins of Pompeii.

Natal is a province of South Africa.

Nazareth. A town of Palestine which is associated with Prophet Christ's early life.

Nejd. Kingdom of central Arabia, mostly desert.

New England. A state in the U.S.A., noted for manufacture of cotton goods.

New Guinea. A large island situated in the East Indies region. The eastern half of a British and Australian and the western half claimed by Indonesia.

New Orleans. A seaport on the River Mississippi (U.S.A.). Great cotton market.

New York. Largest city of U.S.A. A great commercial centre. Noted for it skyscrapers.

Niagra Falls. Largest falls in the world. Partly in Canada and partly in the U.S.A.

Nice (France). Seaport on the Mediterranean. A health resort famous for its baths and sports.

Niger is a river in West Africa.

Nigeria. British Protectorate in West Africa.

Nile River. The longest river in Africa, falls into the Mediterranean.

Ninevah. Ancient capital city of Assyria, with great historical associations. Its site was near Mosul (Iraq).

Nippon. Native name for Japan.

Nishapur. Town in Iran, where Omar Khayyam lived and died.

Normandy. Province of France to the east of English Channel.

Nova Scotia. Important coalfields, situated in East Canada.

Nuremberg. City of Bavaria, noted for Nazi activities before World War II. After Hitler's fall Nazi leaders were tried there. The Nuremberg trials are well known.

Nyassa. The largest lake in Africa.

Oceania. Name given to certain islands of the Pacific.

Oddessa. A seaport of the Ukraine (in Russia) on the Black Sea, noted for wheat export.

Ohio. A state of the U.S.A., rich in oil. Ohio is also a river in the U.S.A.

Olympia. A place in ancient Greece, famous as the scene of Olympic games.

Ontario. Province of Canada, famous for its mineral wealth and grain-producing land.

Orange Free State. Province of the Union of South Africa.

Orange River. A river in South Africa.

Orkneys. Group of islands in the North Sea, forming a country of Scotland.

Orleans. City in France, trading centre for wine and woollen goods.

Osaka. A populous city of Japan, well known for cotton manufactures, Shinto and Buddhist temples.

Oslo. Capital city of Norway with picturesque situation.

Ostend. A seaport of Belgium.

Ottawa. Capital of Canada. Centre of timber trade.

Oval. A famous cricket field in England.

Oxford. Seat of the famous University for classical culture in England.

Palermo. Capital and a seaport of Sicily.

Pamirs. A great plateau in Central Asia, known as the "Roof of the World"

Pampas. Vast grassy plains in South America.

Panama. Town of Central American Republic, situated near the Pacific terminus of the famous Panama Canal.

Panipat. Town in Karnal District (East Punjab—India). Scene of three epoch-making battles in Indian history.

Pantelaria. An island in the Mediterranean between Sicily and Tunisia.

Para. Chief commercial centre, city and seaport of Brazil.

Paris. Capital of French Republic, contains one of the world's finest buildings. Seat of fashions, perfumery toilets, art galleries and universities. A wealthy commercial and industrial city.

Patagonia. It is a desert region in the south of Argentine Republic.

Peiping, Peking. Former capital of China, famous for ancient monuments of strategic importance.

Penang. Island on the west coast of Malay Peninsula.

Perth. A very important town of West Australia.

Peru. A state on the west coast of S. America.

Peshawar. Headquarters of Peshawar Division in West Pakistan. Cantonment of strategic importance.

Philadelphia. Important city and port of U.S.A. An industrial centre with a University.

Pisa. A town in Italy known for its leaning tower.

Pitsburg. Great centre of iron and steel industry in the U.S.A.

Plymouth. Seaport and dockyard town of South England, a great shipbuilding centre.

Polish Corridor. Territory between Germany and East Prussia, giving Poland access to sea. A storm centre during World War II.

Pompeii. Ruined city of Italy situated at the foot of Vesuvius. It is 13 miles from Naples.

Port Blair. In Andaman islands.

Port Elizabeth. A port in New Jersey (U.S.A.). Also a port in Cape Province (S. Africa).

Port Morseby. A town and Government headquarters in British New Guinea.

Port Said. An important port of Egypt, at the Mediterranean end of the Suez Canal.

Portsmouth. Seaport and naval station of England, with vast dockyards.

Potsdam. A town in Prussia, famous for the conference held there in 1945 between Churchill, Truman and Stalin.

Prague. Capital of Czechoslovakia.

Pretoria. Capital of Transvaal, South Africa.

Prussia. State of Germany now under Russian occupation. Rich in mineral wealth. A great industrial centre.

Quebec. City and seaport of the province of Quebec, Canada. Fine harbour.

Queensland. State of N. E. Australia with vast, grassy plains.

Quetta. Headquarters of Quetta Division in West Pakistan. Strong fortress and military centre.

Rangoon. Capital and main port of Burma. Has many famous pagodas. Exports rice. B.O.C. refineries.

Rawalpindi. Headquarters of Rawalpindi Division in West Pakistan. Military Headquarters of Pakistan. Trade centre for Kashmir.

Razmak. A military station in West Pakistan near Bannu.

Red Sea. To the west of Arabia, joining the Arabian Sea with the Mediterranean Sea through the Suez Canal, lies on shortest route to Europe and hence of great strategic importance.

Reunion is a French island in the Indian Ocean.

Rhine, River. One of the chief waterways of Europe, lies on the frontier between Germany and France.

Rhodes. An island of the Dodecanese group.

Rhodesia is a protectorate in Central Africa.

Rhone is a river in Switzerland and France.

Riga. A seaport and capital of Latvia.

Rio de Janeiro. Capital and seaport of Brazil, famous for coffee plantations.

Riviera. A strip of coastland in France and Italy on the Mediterranean with wonderful climate; a health resort.

Rome. Capital of Italy, built on seven hills. One of the most famous and ancient cities of the world, with numerous antiquities and historic associations.

Rostov. A city in the Don, U.S.S.R. It is a great grain market and industrial centre.

Rotterdam. The largest port of Holland. Nearest trade route between England and Germany.

Ruhr. River in Germany, flowing through the district of the same name, containing many iron and steel manufacturing centres.

Saar. River and name of district in West Germany. A great coal mining centre along the river's course.

Saarbrucken. Important town in the Saar Basin.

Sahara. The great N. African desert, largest in the world.

Saigon. Capital of French Indo-China.

St. Helena. An island in the Atlantic, where Napoleon was imprisoned.

St. Lawrence is a river and gulf of North America.

St. Louis. Port of entry of Missouri, U.S.A.

Salt Lake City. Capital of Utah (in U.S.A.)

Samarkand. Historic city in Uzbek, U.S.S.R.

Sandhurst. A famous college for military (Air Force) training in England.

San Francisco. Seaport and city of California. An important port of the U.S.A. on the Pacific coast. The way to it is called the "Golden Gate."

Sarajevo. Town in Serbia (Yugoslavia). Place of assassination of Archduke Francis Ferdinand in 1914, leading to the World War I.

Sarawak is a British colony in Borneo.

Saragossa Sea. A section of the Atlantic Ocean, with masses of brown seaweed which cause great hindrance to navigation.

Scapa Flow. A small sea in the Orkneys, in the North Sea (Scotland). German fleet surrendered here in 1919.

Seattel. An important port of the U.S.A. on the west coast, having trade with Alaska, Japan, Australia and India.

Secunderabad. City on Hyderabad (Deccan). One of the largest Indian military stations.

Seine. River in France, of great commercial importance.

Sennar Dam. A big dam across the Nile near Khartoum, helps in irrigating large areas.

Shanghai. Largest seaport of China, exporting silk and tea. Now under the control of the People's Republic of China.

Shansi. Province of China, rich in iron deposits.

Sharjah. An independent Sultanate of Arabia.

Sheffield. Industrial city in England, famous for cutlery and steel manufactures.

Shikoku is one of the four islands of Japan.

Shillong. Town in Assam, a health resort.

Shiraz. City of Iran, birthplace of the famous Persian poets, Hafiz and Saadi.

Sialkot. Town in West Pakistan. Noted for sports goods of all kinds. Also bicycle manufacturing centre in Pakistan. Place of birth of Allama Iqbal. Most terrible tank battle between India and Pakistan took place in the Sialkot Sector at Chawinda on September 12, 1965. Gallant Pak Forces with the Divine help crippled Indian armoured might. The Sialkot Sector is described as the graveyard of Indian tanks. The military myth of India was exposed.

Sicily. An island in the Mediterranean, the site of famous volcano, Mt. Etna, world's chief source of sulphur.

Sidi Barani. Egyptian town on the shores of the Mediterranean.

Si-kiang. Chinese river. Near its mouth lie Canton and Hong Kong.

Sikkim. State adjoining Bhutan, Nepal and Tibet.

Simplon. A mountain of Switzerland.

Singapore. Island and seaport of the Straits Settlement. It is a naval station of great strategic importance.

Sinkiang is a Chinese Province situated north of Tibet.

Smyrna. An ancient city in Asia Minor, under Turks.

Sofia. Fortified capital of Bulgaria.

Sparta. A city in Greece. Also the name of an ancient kingdom.

Srinagar. Capital of India-held part of Kashmir State. A city with beautiful Mughul gardens.

Stalingrad. City on the Volga, U.S.S.R. Scene of heroic resistance against Germans in World War II.

Stockholm. Capital of Sweden, "Venice of the North" with beautiful surroundings.

Straits Settlement. British colony near Strait of Malacca. Singapore is its chief port.

Stratford-on-Avon. Town of England. Birthplace of William Shakespeare.

Suez. Town at the south end of the Suez Canal.

Sukkur. Town in West Pakistan. Known for the Lloyd Barrage across the Indus, and associated with one of the world's largest irrigation systems.

Superior Lake. Largest fresh-water lake in the world. Lies between the U.S.A. and Canada.

Susa. A city in Persia of historic importance. Scene of excavations.

Sydney. "The Queen of South". Capital of New South Wales, Australia. Largest city in Australia. It is the greatest wool market in the world.

Sylhet. A district of East Pakistan. Famous for its tea gardens.

Tabreiz. Commerical town of Iran.

Tangier is a seaport of Morocco.

Tasmania. An island state of Australia, exports wheat, apples and gold.

Tavoy (Burma). Port in the tin-mining area; exports tin.

Taxila. Town in West Pakistan, near Campbellpur Famous for excavations: Old seat of Buddhist culture.

Tehran. Capital of Iran, famous for carpet industry.

Tel-Aviv. Capital of Israel, built by the Jews.

Texas. A state of U.S.A., noted as the largest cotton-producing region in the world.

Thar, The. A desert, part of which lies in Rajputana (India), and part in West Pakistan.

Thousand Isles. Lake lying between N. Y. (New York) State and Canada.

Three Rivers. A port of Quebec.

Tiflis. Principal town of the Republic of Georgia, U.S.S.R.

Tigris. River of Mesopotamia known to the Arabs as Dijla. A river of the antiquity. Basra and Baghdad are on its banks.

Tokyo. Capital of Japan. A great commercial centre.

Toronto. City in Ontario, Canada; a port with a university.

Trafalgar, Cape. Situated to the south-west of Spain.

Transvaal, The. A province of South Africa.

Trieste. Seaport of Italy. Created as a free state of Trieste in 1947.

Trinidad. British island in the West Indies, famous for oilfields.

Tripoli. A historical seaport of Libya. North Africa, famous for carpets and morocco leather.

Troy. A town in Asia Minor, famous for legends.

Tunis. Seaport and capital of Tunisia. An industrial centre of great trade.

Tuticorn is the southern end of the South Indian Railway. A port for trade with Ceylon.

Ukraine. A republic of Russia. Great wheat producing centre.

Uzbekistan. A Soviet republic (Tashkand, capital).

Valetta. Capital of Malta. Heavily fortified.

Valparaiso. Province and city of Chile, South America. Most important port on the Pacific coast of America.

Vancouver. Island and port of British Columbia. (Canada).

Verkhoyansk (Siberia). The coldest place in the world.

Venice. Seaport of Italy. Capital of the province of the same name. Numerous famous buildings. Canals are the main thoroughfares here.

Verseilles. A French town with royal palace. Treaty of Verseilles (1919) was signed here after World War I.

Vesuvius. Famous live volcano of southern Italy.

Victoria Falls on the Zambesi river in Rhodesia (Central Africa).

Vienna. Capital of Austria, famous for art galleries.

Virginia. State in U.S.A., known for its tobacco and mineral waters.

Vladivostok. Chief port of U.S.S.R., also a naval station on the Pacific.

Volga. A river of U.S.S.R., fallinginto the Caspian Sea.

Wah. Town near Rawalpindi (West Pakistan). Cement factory.

Warsaw. Capital of Poland.

Washington. Capital of U.S.A. Has a large number of magnificent buildings.

Waterloo. Village of Belgium. Napoleon was at last defeated here in 1815.

Waziristan. Region in West Pakistan, formerly known as scene of tribal Afghan activities.

Wellington. Capital and chief port of New Zealand.

Westminster. City and borough of London. Houses of Parliament; St. James and Buckingham Palaces.

White Sea. Sea to the north of Russia.

Wight, Isle of. An island to the south of England.

Wimbledon. Borough in England, famous for its lawn tennis grounds where international matches are played.

Windsor. District of Great Britain, where Windsor Castle, the residence of the British kings, is situated.

Winnipeg. Wheat market on the lake of same name in Canada.

Woolwich. Borough of London. Headquarters of the Royal Artillery. Has important naval and airmen training institutions.

Yangtse Kiang. The great river of China.

Yellow River. An important river in China.

Yellow Sea. Between Korea and China.

Yemen. A Sultanate in S. W. Arabia. It is famous for dates, spices and coffee.

Yenisei. An important river in Sibera.

Yokohama. The most important port of Japan. A manufacturing town, exporting Japanese goods.

Zambesi. A South African river, falls in the Indian Ocean.

Zanzibar. A magnificent seaport of East Africa.

Zululand. British protectorate in S. E. Africa.

Zurich. An important town of Switzerland.

EXAMINATION QUESTIONS

WITH BRIEF SOLUTIONS

1. *What does cause the seasons of a year?*

The fact that the axis of the earth is inclined to the orbit causes the seasons of the year as the earth revolves round the sun.

2. *Why is Siberia such an excessively cold country for its latitude?*

Siberia slopes to the north. Hence, it misses the warmth of the sun's rays and the winters there are extremely severe.

3. *Why is a country like Ladakh very hot in the sunshine but bitterly cold in the shade?*

Ladakh is situated at a high elevation above the sea-level. In such places the atmosphere is rarified (made thin or less dense). A rarified atmosphere offers very little obstacle to the rays of the sun and consequently they are scorching. But the rarified air absorbs very little of the heat of the sun's rays and the atmosphere remains cold; therefore, it is very cold in the shade.

4. *Why is it that in certain regions of the earth there are periods when the sun never sets? Where are these regions?*

The axis of the earth is inclined at an angle of 23½ degrees to the plane of the orbit. In the course of the earth's rotation round the sun when the northern end of the axis is nearer the sun than the southern end, the part of the earth round the North Pole would always be in daylight, *i.e.*, the sun would never set. This land of the midnight sun reaches its maximum limit on the 22nd June every year in the northern and on 23rd December in the southern hemisphere. On these days, the parts of the earth within the Arctic and the Antarctic Circles respectively remain in daylight throughout the twenty-four hours; conversely on these days, the areas within the Antarctic and the Arctic Circles respectively will have a night of twenty-four hours.

5. *Why is knowledge of geography of great benefit to a military officer?*

A military officer has to be very cautious as regards

geographical features of a country through which he leads his army. He must know its routes, its ways and facilities of communications and its climate. He embarks upon his campaign only when he has had a thorough topographical survey of the region. There are so many historical examples where geography has played a highly significant part; as for example, Shivaji's main defence against the Mughul Army was his remarkable knowledge of the Maratha country.

An army may starve if there is no proper food. The military officer must know the different kinds of food crops available near about the battlefield. It is also necessary to beware of the winds and rainfall of the place so as to provide against the forces of Nature. Road construction is essential for the rapid movements of tanks, motor traffic, etc. This can be done only when surface features have been masterly surveyed. The importance of geographical knowledge is thus obvious.

6. *How is it that fogs are more prevalent in the towns than in the country?*

It is a natural phenomenon that the vapour of the atmosphere condenses round dust particles in the air. As the air of towns contains far more dust particles than that of the country, fogs are far more frequent in towns.

7. *What are conditions to determine the climate of any particular region of the earth's surface?*

The following are the chief causes:

(*i*) *Altitude.* The greater the height above the sea level, the colder is the place.

(*ii*) *Latitude.* Places which are near the Equator are hotter than the places away from it.

(*iii*) *The prevailing winds* affect climate, for they are the carriers of both heat and moisture.

(*iv*) *The ocean-currents* affect the climate of a country to a large extent. The Gulf Stream drift has a moderating effect on the climate of the British Isles.

(*v*) *Slope of the surface.* The effect of slope of the land is to decrease or increase the temperature of the area concerned according as the surface slopes towards or away from the sun.

(*vi*) *Position of mountain ranges.* Mountains lying across the path of moisture-laden winds force them to rise, and consequently expand, cool and bring rain.

(*vii*) *The sea.* Places near the sea are cooler in summer and warmer in winter than places farther inland.

8. *What is standard time?*

Standard time is the time observed all over a country which would otherwise have different local times in different longitudes.

9. *Why is local time necessarily different from railway time at most places in Pakistan?*

At any point there is a time when the sun reaches the highest point in its apparent journey through the sky. That point is said to be on the meridian, and when sun is on the meridian it is noon at that place according to the 'local time'. As the earth revolves round its axis, the sun would reach the meridians of different localities at different times. In other words, the local time at different localities would generally be different. For the sake of uniformity, railway time is kept the same throughout a country. Railway time is accepted as standard time all over the country. As such there is a differe-ence between the railway time and local time at different places in Pakistan.

10. *What is a seismograph?*

Seismograph is an apparatus for automatically recording earth tremors. The complete data includes amplitude, direction, maximum velocity and maximum acceleration of every single vibration.

A seismograph consists essentially of a heavy pendulum hung from a massive frame rigidly fixed to the earth, so that when vibrations of the latter occur, the steady mass of the pendulum, which carries a pen, appears to move relatively to the frame, which carries paper for recording. In addition to the common pendulum (which is called the horizontal pen-dulum) consisting of a heavy mass at the end of horizonal rod, and at the other end of which is a pivot, is used.

11. *What do you understand by the following:—*

(*i*) *Isobars*, (*ii*) *Isotherms*, (*iii*) *Weather*, (*iv*) *Climate*, (*v*) *Contours*, (*vi*) *Latitude*, (*vii*) *Longitude*, (*viii*) *Zenith*, *and* (*ix*) *Gulf Stream?*

(*i*) ISOBARS. *Iso* means equal and *bar* means weight (pressure). Hence isobars are lines which join places having the same average pressure at the same time. Isobars do not indicate the actual pressure at a place. They indicate the pressure at a place as it would have been if the place were at sea level.

(*ii*) ISOTHERMS are lines drawn through places which have the same mean annual temperature.

(*iii*) WEATHER. By weather is meant the atmospheric condition of a place at a given time.

(*iv*) CLIMATE. By climate is meant the average of all kinds of weather which a country or region habitually experiences.

(*v*) CONTOURS are imaginary lines connecting places of equal height above sea level.

(*vi*) LATITUDE is the angular distance of a place north or south of the Equator.

(*viii*) ZENITH is the highest point in the heavens directly above one's head.

(*ix*) GULF STREAM is a current flowing in the North Atlantic.

12. *Which is the country called as 'Playground of Europe' and why?*

Switzerland is frequently referred to as "the playground of Europe" because of the sports which can be enjoyed in connection with its natural facilities, *e.g.*, tobogganing, curling' ski-ing.

13. *What do you know of Koh-i-Noor?*

This is a large diamond known as the "Mountain of Lights", belonging to the Great Moghuls, and was taken away by the English from the Sikhs. Now, it is a British Crown jewel. The Koh-i-Noor was obtained from the mines of

Golconda in 1550. Now, it weighs some 102 carats and is valued at two million sterling.

14. *How are the following obtained:—*

(*i*) *Alcohol* (*ii*) *artificial silk* (*iii*) *aluminium* (*iv*) *carbide* (*v*) *cement* (*vi*) *china* (*vii*) *coal-tar* (*viii*) *coke* (*ix*) *glass* (*x*) *glucose* (*xi*) *glue?*

They are obtained from:—

(*i*) potatoes, peat,

(*ii*) cotton waste, or wood-pulp or saw-dust,

(*iii*) alkali water, alumina, and sulphuric acid,

(*iv*) lime and carbon, (*v*) chalk and clay.

(*vi*) clay, firewood or coal, (*vii*) coal,

(*viii*) coal,

(*ix*) sand, potash and soda and silica,

(*x*) starch of maize and potatoes,

(*xi*) bones, hides, skin and boiling water.

15. *How are the following obtained:—*

(*i*) *Honey*, (*ii*) *solder*, (*iii*) *opium*, (*iv*) *paper*, (*v*) *quinine* (*vi*) *rubber*, (*vii*) *rum*, (*viii*) *silk*, (*ix*) *soap*, (*x*) *sodawater*, (*xi*) *lac?*

They are obtained from:—

(*i*) bees,

(*ii*) lead and tin,

(*iii*) juice that oozes out of poppy plant,

(*iv*) straw, rags, wood-pulp, grass, bamboo, linen, clay.

(*v*) bark of cinchona tree,

(*vi*) juice of rubber trees,

(*vii*) molasses and alcohol,

(*viii*) cocoons of silk-worms fed on mulberry plants,

(*ix*) soda or potash, or oils,

(*x*) water and carbon dioxide gas, and

(*xi*) trees; lac is a resinous matter deposited on certain trees by a small insect. Branches of the trees where deposits are found are broken off and washed in warm water. The solution on further operation yields lac.

16. *Which creature produces each of the following:—*

(*a*) *a cocoon,* (*b*) *a pearl,* (*c*) *ambergris,* (*d*) *sperm oil?*

(*a*) Silkworm, (*b*) Pearl oyster,
(*c*) Sperm whale, (*d*) Sperm whale.

17. *What is the second highest mountain in the world?*

Mount Godwin Austin, otherwise known as K 2, in the Himalayas.

18. *What are the three commonest chemical elements in the earth's crust, that is, in the surface layers of the earth, and in the things around us?*

They are oxygen, silicon and aluminium. Oxygen makes up about half the weight of the earth's crust; it exists in combination with other elements.

19. *Which is farther from sea-level, the top of Mount Everest or the deepest known ocean bottom?*

Mindanao Deep, off the Philippine Islands, 36,400 feet.
Mount Everest 29,140 feet

20. *What is the origin of the word "India"?*

The word originated from 'Indus'.

21. *Describe a coastal voyage from Karachi to Chittagong.*

Karachi, Bombay, Colombo, Madras, Masulipatam, Cocanada, Puri, Calcutta, Chittagong.

22. *Fill in the blanks:—*

(*i*) *——is the longest river of the world.*

(*ii*) *——is the greatest jute producer of the world.*

(*iii*) *——and——are two ports of Pakistan.*

(*iv*) *——and——are the two parts of Pakistan.*

(*v*) *——is the longest day in the northern hemisphere.*

(*vi*) *The higher we rise above sea-level the——the air becomes.*

(*i*) The Mississippi, (*ii*) Pakistan, (*iii*) Karachi and Chittagong, (*iv*) East Pakistan and West Pakistan, (*v*) 22nd June, (*vi*) cooler.

23. *Name the different methods by which a letter may be sent from Karachi to London. Name the routes by which it travels.*

(*a*) *By Air*—Karachi, Baghdad, Athens Paris, London.

(*b*) *By Railway and Sea*—through Suez route.

Karachi to Aden, through Suez to Marseilles, Paris, London.

24. *Karachi has been called the natural air gateway of Pakistan. Give reasons to support this statement.*

Karachi is situated on the Great Circle route from England to the Far East. The short distance between any two places on the globe is a curve and this curve is a part of the circle passing through these places and dividing the globe into two equal halves. This is the Great Circle route. Aeroplanes naturally follow Great Circle routes so far as possible.

Karachi not only lies on this route but it also occupies a central position with regard to the communication by air between the United Kingdom and the Far East. It is in line with the great aerial centres for all those planes which fly between Europe and the Far East.

25. *Name the three largest rivers in the world and describe the course followed by any one of them.*

(*i*) *The Mississippi* (*ii*) *The Nile,* (*iii*) *The Yangtse Kiang.*

The Mississippi is the most important river in the U.S.A. It arises in a lake in the state of Minnesota and flows to the Gulf of Orleans and New Orleans. After a flow of about 2,400 miles it joins Missouri at St. Louis. Here the river is a mile wide. The river is used for navigation. The Mississippi is noted for its floods, especially in the lower courses.

26. *What different kinds of rocks are found in the earth's crust? Mention three examples of each kind and explain how they were formed.*

27. *Hard stone, like granite, when long exposed to the action of the atmosphere crumbles at the surface. Explain fully how this weathering is brought about.*

28. *How are earthquakes caused?*

29. *Describe what really happens during an earthquake? What is the cause of this? Why are some zones particularly liable to earthquake shocks?*

30. *How is dew formed?*

31. *What is an Artesian well? Why is it so called?*

32. *How is wind caused?*

33. *Give an account of the causes of ocean currents.*

34. *What is a cyclone?*

35. *What are tides and how are they caused?*

36. *Why do sea breezes blow in the day-time and land breezes at night?*

37. *What are monsoons?*

38. *Why do heavy rains fall in the tropics?*

39. *What do you mean by Trade Winds?*

40. *What is the cause of variation in the length of day and night?*

41. *Why are the higher peaks of the Himalayas permanently covered with snow? State also why is it that well above the permanent snow-line certain rock masses remain exposed not so covered.*

42. *Where are the following currency units found:—Peso, Paisa, Dollar, Marks, Florin, Krone, Lira, Rupee, Dinar, Rouble, Karoma, Yen, Franc, Pengo, Piastre, Pound, Shilling, Crown, Belga?*

43. *What is the currency unit in each of the following countries:—(i) U.S.A., (ii) France, (iii) Germany, (iv) Russia, (v) Canada, (vi) Pakistan, (vii) Egypt, (viii) Turkey, (ix) Iran, (x) U.S.I., (xi) Japan, (xii) China, (viii) Switzerland?*

44. *Name one important commercial product connected with—(a) Java, (b) Zanzibar, (c) Newfoundland, (d) Sweden, (e) Rumania, (f) Baku, (g) Johannesburg, (h) Sicily, (i) Bahrein, (j) Kimberley.*

45. *What are the capitals of the following:—*

(i) Yugoslavia, (ii) Pakistan, (iii) Poland, (iv) Bharat, (v) America, (vi) Canada, (vii) Turkey, (viii) Iran, (ix) Egypt, (x) U.S.I. (xi) Australia, (xii) Burma, (xiii) Afghanistan?

46. *Describe carefully the situation of four of the following towns, and give reasons why each has become so important: Genoa, Trieste, London, Basra, Delhi, Honolulu, Melbourne Wellington, Rawalpindi, Istanbul, Singapur, Edinburgh.*

47. *Name one important industry associated with each of the following places:—Bombay, Sheffield, Glasgow, Ottawa, Jamshedpur.*

48. *Distinguish between waves, currents and tides. Describe the influence of ocean currents on climate and commerce.*

49. *What and where are the following:*

(i) Land of the Rising Sun, (ii) Land of Maple, (iii) Gibraltar of the West, (iv) The City of Popes, (v) Gate of Pakistan, (vi) City of Seven Hills, (vii) City of Magnificent Distances, (viii) The Eternal City, (ix) The Holy City, (x) The Silver City, (xi) The City of Bazaars, (xii) Key to the Mediterranean, (xiii) Land of the Midnight Sun, (xiv) Roof of the World, (xv) Dark Continent?

50. *If necessary, correct the following statements:—*

(1) *25th December is the longest day in the northern hemisphere.*

(2) *Mexico is the capital of Belgium.*

(3) *Railway line from Peshawar to Calcutta is the largest railway line in the world.*

(4) *Panama Canal joins the Mediterranean Sea with the Indian Ocean.*

(5) *Jacobabad is the rainiest place of the world.*

(6) *The Indus is the largest river of Pakistan.*

(7) *East Pakistan is known for jute productioh.*

51. *What and where are the following?—*

(*a*) (1) *Acre.* (2) *Almora.* (3) *St. Peter's.* (4) *Broadway.* (5) *Hollywood.* (6) *Medicine Hat.* (7) *Kremlin.* (8) *The Statue of Liberty.* (9) *The Venice of the East.* (10) *Playground of Europe.* (11) *Venice of the North.* (12) *The African Switzerland.* (13) *The City of the Silent Thoroughfares.* (14) *The Island Continent.* (15) *The Golden Gate.* (16) *Adam's Bridge.* (17) *Adam's Peak.* (18) *Ava Bridge.* (19) *Bab-el-Mandeb.* (20) *Bath.* (21) *Great Bear Lake.* (22) *Black Hills.* (23) *Black Sea.* (24) *Black Mountain.* (25) *Broken Hill.* (26) *Cape of Good Hope.* (27) *Capetown.* (28) *Dar-es-Salaam.* (29) *Dead Sea.* (30) *Dum Dum.* (31) *Edge Hill.* (32) *Golden Gate.* (33) *Golden Horn.* (34) *Iron Gate.* (35) *Ivory Coast.* (36) *Hyde Park.* (37) *Kaffiristan.* (38) *K 2.* (39) *Lake District.* (40) *Land's End.* (41) *Long Island.* (42) *Isle of Man.* (43) *Nice.* (44) *Orange Free State.* (45) *Orange River.* (46) *Salt Lake City.* (47) *Yellow Sea.* (48) *Blackburn.* (49) *Yellow River.*

(*b*) *Aden, Alexandria, Algeria, Algiers, Berne, Berlin, Bolan Pass, Crete, Genoa, Ghana, Greenwich, Harrapa, Hong Kong, Jacobabad, Karachi, Mohenjo Daro, Jerusalem, Gibraltar, Formosa, Panama, Angora, Amritsar, Asansol, Attock, Baku, Balmoral, Batavia, Balkans, Birmingham, Belgrade, Borneo, Budapest, Brussels, Dacca, Chittagong, Damascus, Cairo, Delhi, Dover, Ellora, Fez, Hwang Ho, Kabul, Kimberley, Lahore, Leeds, London, Leningrad, Madrid, Moscow, Mecca, Murree, Malta, Nanking, Oslo, Paris, Quetta, Rangoon, Bombay, Singapore, Suez, Sukkur, Tokyo, Tigris, Wah, Washington, Yemen, Yokohama, Zanzibar.* .

52. *What climatic conditions are required for production of wheat, jute, cotton? Name the countries where they are chiefly grown.*

53. *What do you understand by the rotation of crops? What rotations are practised in your province?*

For answers to questions 25 to 52 please consult the chapter.

PART IV

HISTORICAL INFORMATION

HISTORICAL INFORMATION

(*a*) Important Battles

Name	*Date*	*Conclusion*
	B.C.	
Thermopylae	480	Athens taken by Xerxes.
	A.D.	
Siege of Acre	1189	Crusaders captured Acre.
Bannockburn	1314	Scottish Army under Bruce defeated the English, and won the Scottish independence.
Agincourt	1415	Henry V defeated the French. France conquered.
Bosworth Field	1485	Henry of Richmond (Henry VII of England) defeated and slew Richard. The War of Roses came to an end.
Panipat I	1526	Ibrahim Lodhi was defeated and killed by Babar.
Panipat II	1556	Akbar defeated and killed Hemu.
Haldighat	1576	Akbar the Great defeated Rana Partap.
Plassey	1757	Clive defeated Siraj-ud-Daula.
Wandewash	1760	The English defeated the French. The French East India Company was abolished.
Panipat III	1761	The Marhattas were defeated and crushed by Ahmad Shah Abdali.
Buxar	1761	Shah Alam was defeated by the English.
Saratoga	1779	Bargoyne (Br.) surrendered to the Americans. The independence of the American States achieved.
The Nile	1708	Nelson defeated the French.
Trafalgar	1805	Nelson defeated the French and the Spaniards.

Austerlitez	1805	Napoleon won victory over the Austrians and the Russians.
Waterloo	1815	Napoleon defeated by the Allies.

(*b*) Important Muslim Dynasties of India

Dynasty	*Important Ruler*	*Period*
1. *The Ghaznavi*		996—1116
	Mahmud Ghaznavi	997—1030
2. *The Ghori*		1186—1206
	Muhammad Ghori	1187—1206
3. *The Slaves*		1206—1290
	Qutb-ud-Din Aibak	1206—1210
	Altamash, Balban	1210—1236
	Razia Sultana	1236—1240
4. *The Khilji*		1290—1320
	Jalal-ud-Din	1290—1296
	Ala-ud-Din	1296—1306
5. *The Tughlaq*		1320—1414
	Muhammad Tughlaq	1325—1331
	Firoz Tughlaq	1331—1388
6. *The Sadaat*		1414—1451
	Khizar Khan	1414—1521
7. *The Lodhi*		1451—1526
	Ibrahim Lodhi	1517—1761
8. *The Moghul*		1526—1761
	Babar	1526—1530
	Humayun	1530—1556
	Akbar the Great	1556—1605
	Jahangir	1605—1627
	Shah Jahan	1628—1658
	Aurangzeb Alamgir	1658—1707
	Bahadur Shah	1777—1712
	Jahandar	1712—1713
	Farrukh Siyar	1713—1718
	Ahmad Shah	1748—1754
	Alamgir II	1754—1759

(*c*) Important Treaties, Pacts and Agreements

Place	*Date*	*Parties and outstanding provisions*
Utrecht	1731	Between England, Holland, Austria and France; the War of Spanish Succession was terminated; the French and Spanish Crowns were separated and the expansion of British colonies in America was admitted.
Paris	1763	Between the English and the French; Canada fell into the hands of the English.
Salbai	1782	Between the English and Marhattas; the first Marhatta War came to an end; Madho Rao was acknowledged Peshwa and the English got Salsette and Cassein.
Versailles	1783	Took place between America and England; the American War of Independence ended; the independence of the United States was acknowledged by England.
Manglore	1784	Between Sultan Tipu and the English; Mysore Wars I and II ended.
Bassein	1802	Between Baji Rao and the English; the Peshwa allied with the English; it gave rise to the Second Marhatta War.
Deogaon	1803	Between the English and the Bhonsla; Orissa and Western Berar were ceded to the English.
Arjungaon	1803	Between the Sindhia and the English who got all the territory between the Ganges and the Jumna.
Amritsar	1809	Ranjit Singh and the English estab-

Place	*Date*	*Parties and outstanding provisions*
		lished unity between the English and the State of Lahore.
Paris	1814	Between the French and the English, Napoleon abdicated and retired to Elba.
Sagauli	1916	Between the Nepal Durbar and the English, the Nepal War ended; Kumaun and the Tarai were ceded to the English.
Yandabo	1826	Between the Burmese and the English, the first Burmese War ended; Assam, Arakan and Tenasserim were given to the English.
Lahore	1846	Between the Sikhs and the English, first Sikh War ended; the English got the country between the Sutlej and the Beas, and Gulab Singh was recognised as the ruler of Kashmir.
Brestlitovsk	1918	Two treaties between the Governments of Russia and of the Ukraine respectively and the Central Powers—Germany, Bulgaria, Austria and Turkey. In the turmoil of the Communist Revolution, Russia wanted peace at any cost. Germany dictated terms. Russia lost sovereignty over Russian Poland, Lithuania, Latvia and certain islands in the Baltic Sea. Moreover, Russia had to pay about 45 crore roubles as reparations.
Versailles	1919	Between the Allied and the Associated Powers on the one hand and Germany on the other, the World War I came to an end. Germany lost all her overseas possessions, and

Place	*Date*	*Parties and outstanding provisions*
		was made to admit her sole "War" Guilt" and to pay heavy reparations.
Locarno	1925	*Treaty of Locarno*, also known as *Locarno Pact*, took place between Great Britain, France, Germany, Italy and Belgium. It provided for mutual guarantees against aggression, especially in the Rhineland.
Ottawa	1932	*Ottawa Pact* was signed at the Imperial Economic Conference that took place between Britain and the Dominions, India and South Rhodesia. They undertook to give preference to the goods of U.K. and of each other.
Munich	1938	Parts of Czechoslovakia were ceded to the Reich.
Munich	1938 Sept.	It was a pact between Britain, France, Germany and Italy. The Sudetan German districts of Czechoslovakia were ceded to Germany without plebiscite.
Berlin	1940 Sept.	*Tripartite Pact* was signed by the Governments of Japan, Italy and Germany. The signatories undertook to co-operate with one another "in Greater East Asia and the regions of Europe respectively, wherein it was their prime purpose to establish and maintain a 'new order' of things calculated to promote the mutual prosperity and welfare of the peoples concerned."
Moscow	1941 July	Agreement between the British and Soviet Governments. They under-

Place	*Date*	*Parties and outstanding provisions*
		took to help each other against the Hitlerite Germany in every way and not to make peace except by mutual agreement.
Atlantic	1941 Aug. 14	*Atlantic Charter*. The President of the United States of America (Mr. Roosevelt) and the Prime Minister of Britain (Mr. Churchill) met "somewhere on the Atlantic." They issued a joint declaration of the peace aims of the U.S. and Great Britain.
Washington	1942 Jan.	*Washington Pact*. It was signed by twenty-six Allied countries. The signatories undertook to employ their full resources to defeat the Axis Powers and not to conclude a separate peace or armistice.
Moscow	1945 Dec.	The Moscow Agreement was reached at the Moscow Conference of the Foreign Ministers of Russia, Britain and the U.S.A. They agreed to draw the former German Satellites. Allied Council for Japan was set up. They also agreed to set up a provisional Korean Democratic Government.
Washington	1949 April	*North Atlantic Pact*. It is a treaty between 15 North Atlantic nations —Britain, U.S.A., France, Canada, Norway, Sweden, Denmark, Belgium, the Netherlands, Luxembourg, Portugal and Italy. Turkey and Greece were included later on. Signatories pledged to recognise an attack on all. Valid for 10 years; can be extended. To

Place	*Date*	*Parties and outstanding provisions*
		the British it is "the greatest step towards peace;" to the Americans "a shield against the fear of aggression;" but the Russians describe this Pact as "aggressive."
Liaquat-Nehru Pact *or* Delhi Minorities Pact	1950	India and Pakistan guaranteed to the minorities all fundamental rights.
Arab Collective Security Pact.	1950 une.	Signed at Alexandria between five Arab League countries—Egypt, Saudi Arabia, Syria, Lebanon, Yemen; linked themselves in a military, political and economic alliance. The Pact stipulated that armed attack on any one of them would be considered aggression against all and it provided for "all military and other aid."
San Francisco	1951 Sept.	*Japanese Peace Treaty.* Between Japan and forty-eight nations excluding Soviet Russia. The treaty consisted of 27 articles. It is stated to have restored full sovereign rights and the independence of Japan enabling her to become a member of the United Nations. She lost all her overseas territories. The losses were a severe blow to Japan.
Anzus	1951 July	*Tripartite Pacific Security Pact.* It was signed by Australia, New Zealand, and the U.S.A. Each party undertook to recognise that an armed attack in the Pacific area on any of the parties would be dangerous to its own peace and safety and should act to meet the common danger.

Place	*Date*	*Parties and outstanding provisions*
U.S.-Japanese Security Pact	1951 Sept.	Between the U.S.A. and Japan. It gave America the right to maintain "land, air and sea forces in and around Japan after the Allied occupation of Japan ended."
Sino-Soviet Agreement	1952 Sept.	Russia and the Chinese Republic resolved to use all efforts to strengthen and to develop co-operation between the two countries; agreement on joint security arrangements.
International German Pact	1953 Feb. 27	Between West Germany and Britain, France, the U.S.A., and also other countries: Pakistan, Ceylon, Canada, Spain, Switzerland, South Africa. West Germany promised to repay loans amounting to 137 million marks.
Balkan Pact	1953 Feb. 28	Between Turkey, Yugoslavia and Greece. Agreed to defend themselves jointly "against any exterior force", to "unite their efforts against outside aggression."
Tashkent Declaration	1966 Jan. 10	India and Pakistan agreed in the presence of the Soviet Premier to withdraw their armed forces to August 5, 1965 positions and observe "cease-fire terms on the cease-fire line" and to restore normal functioning of diplomatic missions. They agreed to repatriate prisoners of war, return assets taken over by either side in connection with the conflict, discourage propaganda against each other, and consider measures for restoration of economic and trade relations and communications and

Place	*Date*	*Parties and outstanding provisions*
		cultural exchanges. Both agreed to exert all efforts to create good-neighbourly relations in accordance with the Charter of the United Nations which placed the two under obligation not to resort to force and settle their disputes through peaceful means. They considered that the interests of the two countries were not served by the continuance of Indo-Pakistan tension. The declaration made a special mention of the Jammu and Kashmir dispute which was a major subject of discussion at all levels. The document also spelled out the background against which this basic cause of conflict between the two countries was discussed.

Turco-Pakistan, Arab Collective Security Pact, SEATO, etc., please consult the Section on "Current Topics."

EXAMINATION QUESTIONS

(WITH BRIEF SOLUTIONS)

1. *Give a brief account of the following:—*

(*i*) *Crusades*, (*ii*) *Hundred Years' War*, (*iii*) *Thirty Years' War*, (*iv*) *Seven Years' War*, (*v*) *American Revolution*, (*vi*) *French Revolution*, (*vii*) *Crimean War*, (*viii*) *Indian Mutiny*, (*ix*) *American Civil War*, (*x*) *Sino-Japanese Wars*, (*xi*) *Russo-Japanese War*, (*xii*) *Balkan Wars*, (*xiii*) *World War I*, (*xiv*) *Spanish Civil War*, (*xv*) *World War II*, (*xvi*) *Korean War*.

(*i*) *Crusades* were military expeditions to recover Palestine from the Non-Christians. The expeditions were mainly sent from Europe. There were eight crusades that were organised during the period 1095 to 1271.

(*ii*) *Hundred Years' War* (1337-1353). The possession of French territory by English Kings from the days of the conquest onward was a frequent cause of Anglo-French conflict, but the series of wars known as the Hundred Years' War was not continuous. The immediate cause of the war was the shelter given by Edward III to Robert of Artois, expelled by Philip VI from France.

(*iii*) *Thirty Years' War* (1618-48). It was a series of wars fought between Hapsburg Empire or allied with Spain and the Catholic League and Protestant German States supported by France, Sweden and Denmark; started as a quarrel between the Catholic and Protestant States; developed into a struggle for supremacy in Europe between Hapsburg Empire and France. The war came to an end in 1648 with the Peace Pact of Westphalia. The principle of religious independence was secured and Switzerland was recognised as an independent state.

(*iv*) *Seven Years' War* (1756-63). It was the third and most terrible conflict between Prussia allied with England

and a coalition of Austria, France, Russia, Sweden and Saxony. The object of coalition was to destroy the power of Frederick the great, of Prussia, and retake for the Empress Maria Theresa, her lost territory of Salesia. The war had far-reaching effects on the destinies of England, France and Prussia. The superiority of the British at sea enabled them to capture many of the French islands in the West Indies.

(v) *American Revolution* (1775-83). This is also known as the *War of American Independence.* This was a conflict between sea-board colonies of North America and British forces sent to subdue them resulting ultimately in American independence from England and the constitution of the U.S. The cause of unrest in America lay in the fact that although the Crown permitted colonial assemblies, their resolutions and demands were met with; there was no American representative, whereas the taxations and levies were imposed upon the colonies by Parliament.

(vi) *French Revolution* (1789). The French people had many grievances. The whole social system was based on privilege and inequality. Enormous taxes were levied on peasants by the nobles. The *bourgeois*, on the whole a rich and educated class, could get no exemption from taxes as did the nobles. Although poorer classes were powerless to protest, the revolution developed through many able thinkers and writers, such as Voltair, Rousseau, mostly of the middle class who had long felt the old regime to be intolerable and did not hesitate to publish their views, as for example "Man is born free and yet is everywhere in chains." The success of American Revolution encouraged the revolutionary elements a great deal. At last, the public rose against nobles as their enemies. "Liberty, Equality and Fraternity" were their slogans. The nobles were imprisoned, guillotined, and shot dead. The revolution achieved the destruction of the old ways of government and altered the whole course of politics and economics throughout the world.

(*iii*) *Crimean War* (1854-56) was fought between Russia on one side and Turkey aided by Britain, France and Sardinia on the other, was occasioned by a conflict over the supposed right of Tsar to protect all Christians in the Sultan's dominions. The attack by the Allies on the naval base of Sebastopol in

the Crimea was the main feature of the war. The campaign is famous for allied victories at Inkerman and Balaklava.

(*viii*) *Indian Mutiny* (1857) was a widespread "rebellion", as the British called it, chiefly of the army against the British authority in India. It was a national uprising in which Bahadur Shah, the last Mughal Emperor, Nana Saheb and the Rani of Jhansi were the chief leaders. But it was put down mercilessly with a cruel hand by the British.

(*ix*) *American Civil War* (1860-65). It was fought between the 11 Southern States and the Northern Federal States. The former wished to maintain their "States' rights" and claimed the right to secede, whereas the latter fought to maintain the Union. The Northern Federal States came out victorious. Slavery was abolished and great economic progress followed.

(*x*) *Sino-Japanese Wars*. I. (1894-95): broke out over the question of Korea and ended in Japanese victory and the annexation of Formosa. II. (1931-33): originated in disputes regarding Japanese interest in Manchuria and resulted in Japan setting up a new State in Manchuria, named Manchukuo. III. (1937-45): Japan invaded viciously and, with great force, in an undeclared war. Japan succeeded in the first instance. But the long extended Japanese lines were subjected to guerilla attacks, and river floods caused great losses. Russian troops invaded Machukuo after Russia's declaration of war on Japan on August 8, 1945, and overran virtually all of the State before Japanese acceptance of Potsdam Declaration and subsequent surrender.

(*xi*) *Russo-Japanese War* (1904-5) broke out over the seizure, by Russia, of Port Arthur, Japan wanted Russia to evacuate Korea and Manchuria. The American mediation in 1905 ended the war. Japan gained most of her demands.

(*xii*) *Balkan Wars* (1912-13) were fought by Bulgaria and Serbia for the conquest of Turkish European territory. Montenegro and Greece also joined them. They conquered all Turkey-in-Europe except the district of Constantinople. Later on, Turkey regained from Bulgaria a part of her former territory including Adrianople. The wars were regarded as one of the causes of the World War I by stimulating Serbia's desire for territory of Austria-Hungary which naturally engendered distrust.

(*xiii*) *World War I* (1914-18). It was an international conflict between the Central Powers, *i.e.*, Germany, Austria, Turkey and Bulgaria on one side and the Allies, *i.e.*, Britain France, Japan, Belgium, etc., on the other side. This was for the first time in history that World Powers were involved in a war. The underlying causes go far back into the complexities of European diplomatic and economic history; racial conflicts breeding political ambitions and jealousies. The immediate cause was the assassination of Archduke Francis Ferdinand, heir to the throne of Austria, by a Serb on June 28, 1914. The Allies ultimately defeated the Central Powers and hostilities ceased with an armistice on November 11, 1918. The power of German nation was broken.

(*xiv*) *Spanish Civil War* started in 1936. General Franco rose against the Republican Government of Spain. Germany, Italy and France secretly helped Franco who succeeded in overthrowing the Republic.

(*xv*) *World War II* (1939-45). Germany rose again under the leadership of Adolf Hitler and began to demand her colonies lost in the World War I. The immediate cause was the invasion of Poland by Germany, on September 1, 1939. The Axis Powers—Germany, Italy and Japan—were on one side and the Allies—Great Britain, France, Belgium, America, etc.—on the other side. Later on Russia also joined the Allies. The German conquests were sweeping during the first stages of the war. They occupied Poland, the Netherlands, France and got a strong foothold in Libya and North Africa. The Germans invaded Russia. The Russian Line bent but did not break. The Germans could not carry on war successfully on so many fronts. The Allies occupied Italy. The Russians opened a large-scale offensive against Germany. The Allied forces landed in France. Germany's armed forces made an unconditional surrender to the Allies on May 7, 1945. Germany was divided by Russia and Western Powers into Eastern and Western Zone. Following the dropping of atomic bombs on Hiroshima and Nagasaki and the crossing of the Manchurian and Korean frontiers by Russia, Japan offered surrender on August 10, 1945.

2. *When was* (*a*) *slavery abolished in the British Empire* (*b*) *French Revolution staged*, (*c*) *The New World discovered*,

(*d*) *Declaration of American Independence made?*

(*a*) 1883, (*b*) 1793, (*c*) 1492, (*d*) 4th July, 1776.

3. *What important events took place in* (*a*) 1588 (*b*) 1688, (*c*) 1757, (*d*) 1815, (*e*) 1939 *and* (*f*) *August*, 1939?

(*a*) Spanish Armada defeated, (*b*) Glorious Revolution took place and, in consequence, James II abdicated and fled to France. (*c*) Battle of Plassey, (*d*) The Battle of Waterloo; the final overthrow of Napoleon, (*e*) World War II began, and Britain and France declared war on Germany, and (*f*) Partition of India into Pakistan and Bharat took place with effect from 15th August, 1947.

4. *Arrange the following in chronological order: Battle of Waterloo, Crimean War, End of Moghul Empire, Opening of Suez Canal, Renaissance.*

(*i*) Renaissance, (*ii*) Battle of Waterloo, (*iii*) Opening of Suez Canal, (*iv*) Crimean War, (*v*) End of Moghul Empire.

5. *Who was* (*a*) *the lame king who sacked Delhi,* (*b*) *The blind king of Delhi,* (*c*) *The king who placed the "Peacock Throne" in Delhi,* (*d*) *the king who took away the "Peacock Throne" from Delhi?*

(*a*) Taimur, (*b*) Shah Alam II, (*c*) Shah Jehan, (*d*) Nadir Shah.

6. *How are the following commonly known in history:—*

(*i*) *Herodotus,* (*ii*) *Sir Walter Scott,* (*iii*) *Edward VII,* (*iv*) *Ranjit Singh,* (*v*) *Alfred,* (*vi*) *Balban,* (*vii*) *Disraeli,* (*viii*) *Magna Carta,* (*ix*) *Napoleon Bonaparte,* (*x*) *Kemal Pasha,* (*xi*) *Prince Bismark,* (*xii*) *Francis Bacon,* (*xiii*) *Queen Elizabeth* (*xiv*) *M. A. Jinnah,* (*xv*) *M. K. Gandhi?*

(*i*) Herodotus, the "Father of History." (*ii*) Sir Walter Scott, the "Great Unknown," (*iii*) Edward VIII, the "Peace Maker," (*iv*) Ranjit Singh, the "Lion of the Punjab," (*v*) Alfred, the "Lawgiver," (*vi*) Balban, the "Greatest of the Slave Kings," (*vii*) Disraeli, the "Mysterious man in the English political world," (*viii*) Magna Carta, the "Bible of the English Constitution," (*ix*) Napoleon, the "Child of the French Revolution," (*x*) Kemal Pasha, "Maker of Modern Turkey," (*xi*) Prince Bismark, the "Maker of Modern Germany" and the "Man of Blood and Iron," (*xii*) Francis

Bacon, the "Father of Modern Science," (*xiii*) Queen Elizabeth, the Virgin Queen of England," (*xiv*) M. A. Jinnah, the "Father of Nation," "Founder of Pakistan." "Quaid-i-Azam," (*xv*) M. K. Gandhi, the "Mahatma" and the "Bapu" of Hindus.

6. *Give (approximately) the period during which the following dynasties ruled.*

(*i*) *Gupta*, (*ii*) *Maurya*, (*iii*) *Moghul* (*from Babar to Aurangzeb*). (*iv*) *Chola* (*South India*). (*v*) *Tughlaq*. (*vi*) *Tudor*.

(*i*) 300—600 A.D. (*ii*) 320—184 B.C.
(*iii*) 1526—1707 A.D. (*iv*) 907—1267 A.D.
(*v*) 1320—1414 A.D. (*vi*) 1485—1603 A.D.

7. *Mention an important event connected with each of the following dates:—*

(*i*) 1919, (*ii*) 1848, (*iii*) 1917, (*iv*) 1945, (*v*) 1757, (*vi*) 1498.

(*i*) Treaty of Versailles.

(*ii*) Battle of Chillianwala took place between the Sikhs and the English. The English established hold over the Punjab.

(*iii*) Revolution in Russia.

(*iv*) The Second World War ended; The UNO formed; The U.S.A. dropped atom bombs on Nagasaki and Hiroshima, two cities of Japan.

(*v*) Battle of Plassey.

(*vi*) Sea route to India *via* Cape of Good Hope discovered by Vasco da Gama.

8. *What important historical events do you associate with the following years or dates:—*

(*a*) August 15, 1947, (*b*) 1857, (*c*) 327 B.C., (*d*) 563 B.C., (*e*) 1853 A.D., (*f*) 1600 A.D.?

(*a*) India divided into two independent states, *viz.*, Pakistan and Bharat.

(*b*) First War of Indian Independence or the 'Mutiny' of 1857 (as the British called it).

(*c*) Alexander the Great invaded India.

(*d*) Birth of Gautama Buddha.
(*e*) First Railway line opened from Bombay to Thana.
(*f*) The East India Company established.

9. *Mention an important event associated with the following dates:*

(*a*) 33 A.D., (*b*) 570 A.D., (*c*) 1348 A.D., (*d*) 712 A.D., (*e*) 1492 A.D., (*f*) 1789 A.D., (*g*) 1942 A.D., (*h*) 1871, (*i*) 1896, and (*j*) 1905.

(*a*) Jesus Christ crucified (not really).
(*b*) Birth of Prophet Muhammad (peace be upon him).
(*c*) Black Death in England.
(*d*) Arab invasion of Sind by Muhammad bin Qasim.
(*e*) Columbus discovered America.
(*f*) The French Revolution began.
(*g*) Sir Stafford Cripps' Proposals for India; Quit-India Movement.
(*h*) Germany declared as United Federal Empire and William I proclaimed Emperor.
(*i*) Marconi invented Wireless Telegraphy; Rontgen discovered X-ray.
(*j*) Bengal partitioned and a new province called Eastern Bengal and Assam created; Einstein introduced his Theory of Relativity.

10. *What happened on the following dates in World War II?*

(*i*) *May* 10, 1940, (*ii*) *June* 22, 1941, (*iii*) *August*, 1941, (*iv*) *December* 7, 1941, (*v*) *June* 6, 1944.

(*i*) Germany invaded Luxembourg, Belgium and Holland.
(*ii*) Russia invaded by Germany.
(*iii*) Atlantic Charter framed.
(*iv*) Japan attacked Pearl Harbour.
(*v*) The Allies landed in Normandy.

11. *Mention the principal events that occurred in:—*

(*a*) 1206, (*b*) 1739, (*c*) 1815, (*d*) 1863.
(*b*) Qutb-ud-Din Aibak founded the Slave Dynasty.
(*c*) Nadir Shah invaded India.
(*d*) Napoleon defeated in the Battle of Waterloo.
(*e*) Abraham Lincoln abolished slavery in the U.S.A.

12. *When were the following battles fought, who were the contesting parties and who won?*

(*i*) *The first Battle of Panipat.* (*ii*) *The Battle of Blenheim.* (*iii*) *The Battle of Plassey.* (*iv*) *The Battle of Trafalgar.* (*v*) *The Battle of Chillianwala.* (*vi*) *The Battle of Omdurman.*

	Date	*Battle*	*Parties*	*Who won*
(*i*)	1526	Panipat	Between Babar and Ibrahim Lodhi	Babar
(*ii*)	1704	Blenheim	England and France	England
(*iii*)	1757	Plassey	Clive and Siraj-ud-Daulah the Nawab of Bengal	Clive
(*iv*)	1805	Trafalgar	England and France	England but Nelson died.
(*v*)	1848	Chillian wala	The English and the Sikhs	The English
(*vi*)	1898	Omdurman	Lord Kitchner of England and the Sudanese Army.	Lord Kitchner. Anglo-Egyptian joint rule over Sudan established.

13. *In which year did the following happen?*

1. Alexander invaded India.
2. Julius Caesar invaded Britain.
3. Muhammad the Holy Prophet was born.
4. Muhammad-bin-Qasim invaded India.
5. Vasco da Gama discovered sea-route to India.
6. Battle of Plassey.
7. Third Battle of Panipat.
8. 'Mutiny' or the first War of Indian Independence.
9. British rule ended in India.
10. The Hijra Era.
11. Magna Carta signed by the English King John.
12. Columbus sailed on his first Expedition which later led to the discovery of America.
13. Admiral Drake defeated the Spanish Armada.

14. Shakespeare died.
15. Trial and execution of Charles I.
16. Battle of Blenheim.
17. Declaration of American Independence and formation of the United States consisting of thirteen States.
18. Treaty of Versailles.
19. Beginning of French Revolution. Election of George Washington as first President of the U.S.A.
20. Battle of Nile, in which the English, under Nelson, gained victory over the French.
21. Battle of Trafalgar.
22. Battle of Japan, where Russia suffered crushing naval defeat.
23. Outbreak of World War I.
24. Termination of World War I.
25. The formation of League of Nations.
26. Signing of NATO.
27. Battle of Jutland.

(1) 327 B.C.	(2) 55 B.C.	(3) 569 A.D.
(4) 712	(5) 1498	(6) 1757
(7) 1761	(8) 1857	(9) August 15, 1947
(10) 622	(11) 1215	(12) 1492
(13) 1588	(14) 1616	(15) 1649
(16) 1704	(17) 1776	(18) 1783
(19) 1789	(20) 1798	(21) 1805
(22) 1905	(23) 1914	(24) 1918
(25) January 10, 1920	(26) 9th April 1949	(27) 1916

14. *Specify the seventeen days of Indo-Pakistan War.*

The seventeen days of Indo-Pak war were from September 6, 1965 to September 22, 1965. India started undeclared aggressive war against Pakistan But with the help of God she suffered a crushing defeat at the hands of Pak forces. The Indian military myth was exposed before the world.

PART V

LITERATURE

CHAPTER I

LITERATURE AND ITS PLACE IN LIFE

Animals, infants, sheep, dogs, birds, etc. express rage, discomfort and delight by their shrieks or noises. A hen clucks at her brood of chickens, and squawks in terror. A crow caws when it finds some food. Asses bray, bulls bellow, cats mew, goats bleat, monkeys chatter, lions roar, snakes hiss, pigeons coo, owls hoot and so on. They give expression to a particular type of crying.

Similarly, man expresses himself to a limited extent, when he sighs, shrieks, moans and mutters. But he has come to use words to express his emotions and thoughts. How he has achieved it is a long story which cannot find space here. He communicates to others his thoughts and emotions by speech and to the coming generations through his letters or works. But for this, like other animals, man would not have been able to pass on his experience to the coming generations.

What is Literature? Literature is the science of letters or what is written, the whole body of literary compositions in any language or on a given subject. Literature has come to mean all literary productions except those relating to positive science and art.

In ancient times the authors were men of action—travellers, architects or statesmen. They fought battles, they adventured in strange lands, they governed, they made laws, raised buildings; and what they wrote was in large part derived from their contact with the life of the world in which they participated. Only within comparatively modern times have a class arisen that makes literature the sum of its life—the professional literary class.

Place of Literature in Life. Some knowledge is essential to the living of well-balanced life, One may wax rich in worldly wealth and still lack that imperishable functioning of

the man which can be acquired only in communion with the great intellects that have made the world's literature. He is, so to say, intellectually dead. For, as surely as the body dies for the lack of food, or grows unhealthy by improper feeding, so does the mind of man languish, and dies if mental nourishment be withheld. We have all met persons of strong bodies who have been blessed with material wealth, but whose minds were vacant places where no charming things existed, yet where these might have been had the impulse come, the effort been made, at the proper time, toward literary culture.

All the same, it must not be taken that the reading of book is the be-all and end-all of mental culture. Just as there is over-development of the man physically, it is no uncommon thing for a man to become attached to mere book-learning to the exclusion of many other essential elements of mental culture which produce a well-balanced, four-square life. There are nobler things than to be rich in the lore of the world; but let a man be never so well endowed in all the attributes of good character, he will still be the better man by some measure of acquaintance with the treasures of literature: in fact it is hard to know how he may acquire, the more worthy traits of character without the ministry of literature, direct or indirect. A man who confesses that he has no knowledge of books tells us that the blind are close drawn on some of the windows of his soul.

The true purpose of literature is: "Read not to contradict or confute, not to believe and take for granted, not to find talk and discourse, but to *weigh and consider*, that is the true purpose of all useful reading. We have not to read for the mere storing of our minds with multitudinous facts, not yet with sensuous fancies, which seem to be the chief results of the tremendous consumption of modern printed matter. In order to 'weigh and consider' there must be discretion."

CHAPTER 2

LITERARY TERMS

Accent. Stress laid down on a particular syllable in a word in pronunciation.

Affix, a syllable, not a word in itself, which can be added to an existing word in order to change its meaning.

Allegory is a description of one thing under the image of another. This is a metaphorical form of narrative in which a deeper and usually moral significance underlies the superficial and obvious story.

Alliteration. By alliteration is meant using in poetry and to some extent in prose, of several words beginning with the same letter, as for example:—

"You big, black, bounding beggar,
You broke the British square"—Kipling.

Or "An Austrian Army Awfully Awayed."

Anagram is a re-arrangement of letters of a word or phrase which produces another word or phrase: *e.g.* 'Florence Nightingale' becomes, Flit on, cheering angel'.

Antecedent is a word which determines the form of another word coming later in the sentence: *e.g.* in 'Few boys would say that they enjoy washing behind their ears,' **boys** is the antecedent of the pronoun *they*, which therefore must be in the plural.

Antithesis are words arranged to stress a contrast: *e.g.* 'To err is human, to forgive divine.'

Antonym is a word the meaning of which is directly opposite to that of another word: *e.g. light* and *dark*, *large* and *small*, *clean* and *dirty*.

Apposition, a second description of a person or thing placed side by side with the first, the second having grammatically the same value as the first, *e.g.* Muhammad Aslam, *Mr. Pakistan* scored the final try.

Archaism. Obsolete words, phrases, idioms or syntax, the use of which is dangerous except in the hand of an experienced writer who can trust his sense of congruity.

Assonance. A kind of rhyme consisting in resemblance or similarity in sound, the coincidence of the vowels of the corresponding syllables, without regard to the consonants, as in *mate* and *shape*, *fees* and *need.*

Autobiography. *Autos*, oneself; *bio*, life; *graphein*, to write. Autobiography is an account of one's life written by himself.

Ballad. Fr. *Ballade*, from *ballara:* to dance, being originally a song sung to the rhythmic movement of a dancing chorus. Ballad is a simple spirited narrative poem in short stanzas of two or four lines in which a story is told in straightforward verse, often with great collaboration and in detail. It is composed with a spirit, generally of patriotic interest.

Biography. A written account or history of the life of an individual.

Blank Verse. Unrhymed verse, in iambic decasyllabic measure. Every even number of the 10 syllables is stressed in early strict examples. It occurs in Chaucer's works. It was perfected by Marlowe and Shakespeare as a medium for epic and dramatic poetry, and was revived and transfigured by Milton.

Bombast. A form of language marked by extravagant and high-sounding words.

Character is generally applied to the personages in a literary work.

Classic is a piece of literary composition which has achieved a remarkable position in literary history for its superior and marked literary qualities, also its author being of like standing.

Clause is a group of words containing subject and predicate but not expressing a complete idea: *e.g.* 'A marshal *who can rid the town of rustlers*—that's what we want.'

Comedy is a humorous play with a pleasant end. Shakespeare's *As You Like It* is a comedy.

Couplet. A couplet consists of two rhymings.

Dirge is a funeral song or hymn. The word dirge is contracted from *dirige*, the first word of an antiphone sung in the office for the dead. This word also stands for short lyric of lamentation.

Drama. A complete dramatic work is called a drama. Dramas are classified as tragedies or comedies.

Eclogue is short poem of a pastoral nature.

Elegy. An elegy is a form of funeral poem. It is generally a poem mourning the death of a great man, but it may express the sadness of life.

Emphasis. Stress laid on a particular word.

Epic is a narrative poem usually partly historical and partly fictitious. The groundwork is, as a rule, the adventures of some national hero.

Epigram is a short poem, especially one with a witty twist in it; any sharp, memorable saying.

Epilogue (*Epilogos*, conclusion). A speech or a short poem at the end of a play.

Etymology, the study of the origin of words.

Euphemism, disguising a nasty fact with a nice name: *e.g.* saying 'he is putting on weight' when you mean 'he's getting fat'.

Eulogy is a literary form of composition in which the character or life of some person is praised.

Fable. Any tale in literary form, prose or verse, not necessarily probable in its incidents. It is intended to amuse or convey a moral lesson.

Farce. A short humorous play in which plot and incident are exaggerated. The intenion of such a dramatic piece is to excite laughter.

Figures of Speech. A figure of speech is a form of expression where something else is meant than actually said, *e.g.*, "a torrent of abuse"; "footprints on the sands of time".

Foot in poetry means a certain number of syllables constituting a distinct part of a verse.

Free Verse is a verse with irregular metrical scheme. It does not even form a regular rhythm of the usual poetry. This form of verse has great possibilities for subtle effects.

Humour is the moisture or fluids of animal bodies. The four chief liquids of the human body: blood, phlegm, yellow bile, and black bile, were known as 'humours'. Humour is state of mind (because one's thoughts depend upon the humours of the body), as 'good' and 'ill' humour.

Hyperbole. The figure of exaggeration by which a thing is made so much greater, or even so much less than it really is.

Iambus. A measure of foot used in poetry consisting of two syllables of which the second only is accented, *e.g.*, away.

Idyll is really a picture in poetry—a description of a country scene or an anecdote—"rounded into a song."

Imagery implies the use of figurative language for rhetorical or poetic effect.

Inflexion, the change made in the form of words to show what grammatical part they play in a sentence: *e.g. him* is formed by inflexion from *he*.

Innuendo. The figure of insinuation, by which something disagreeable is indirectly hinted.

Interlude. A short piece of music played between the parts of a drama, opera, hymn, etc.: an interval.

Irony. The figure of disguise, meaning the opposite of what is said.

Lay. A song or short narrative poem.

Litotes, a deliberate understatement for effect: *e.g.*, saying *not a few* when you mean *a great many*.

Legend is an incredible, unauthentic narrative.

Lyric. A short poem expressing one incident, situation or emotion. The subjects are mainly love, war, feasting. Originally lyrics were intended to be accompanied by the lyre.

Metaphor. (*Meta*, over; *pherein*, to carry). Metaphor "Transferring" is a literary device, a sort of extended simile in which the actions of one thing are ascribed to another, *e.g.* 'the horse flew over the ground'.

Metonymy is naming something not by its own name but by something closely associated with it: *e.g.*, 'The Crown' for 'the Government'.

Mixed Metaphor, using together metaphors that don't match, with ridiculous results: *e.g.* 'Well, he's a dark horse. and he can paddle his own canoe.'

Metre. A rhythm established by the regular or almost regular recurrence of similar accent-patterns (feet). The iambic, trochaic, anapaestic are the most popular metres.

Muses, The. In Greek mythology there were nine daughters of Jupiter and Mnemosyne. They are considered to be the patrons of literature, art and science. Their names and the branches of knowledge over which they presided are Calliope (Epic poetry), Clio (History), Enterpe (Lyric poetry), Melpomene (Tragic poetry). Terpsichore (Dancing and Choral poetry), Thalia (Comedy) and Urania (Astronomy).

Music is artistic expression by voices of instruments of melodic, rhythmic or harmonic tones.

Novel. Literally, it means new, unusual, strange. The term 'Novel' is now exclusively applied to a fictitious prose narrative of considerable length, representing human beings their actions, adventures and passions, and displaying varieties of human character in history or everyday life.

Ode is a form of lyric poerty, that is, poetry which is capable of being set to music as the name implies. It may be described as a song of praise addressed to a great person, a nation, a season or to anything living or dead, which can reasonably be addressed in this way. In the words of Professor Gosse, the ode is "any strain of enthusiastic and exalted lyrical verse, directed to a fixed purpose and dealing progressively with one dignified theme."

Oxymeron is using together in one expression words that are contradictory: *e.g.*, Madam, I'm Adam'.

Periphrasis is presenting an idea in a round about, wordy way.

Poetry is a form of art, different from, yet analogous to, other forms of art such as painting, sculpture or music. It is

the art of expressing in melodious words the thoughts which are the creation of feeling and imagination; utterance in song: meterical composition. In the words of Carlyle, "Poetry, therefore, we will call musical thought. Good poetry must be sincere, must stir the emotions, while avoiding the pit of sentimentalism it must conform to certain standards of technical perfection."

Poetry is divided into certain classes or types, such as the Epic, the Lyric, the Drama, the Satire, the Ode, the Elegy, and many others.

Poetic Licence is the privilege claimed by poets of departing from normal order, rhyme or pronunciation. The idea is that their verse may meet the requirements of their metrical pattern.

Poet-laureate is the national poet. He is appointed by the Prime Minister of the day and the appointment is for life.

Prefix, an affix attached to the beginning of words: *e.g.*, *dis-*, *un-*, *in-* in the words 'disappeared', 'uninterested', 'invaluable'.

Prosody, the technique of verse—its rhyme, metre, etc.

Pun is a play on words, different in meaning but the same in sound, so as to produce an amusing effect, *e.g.*, Tom Hood's.

A cannon-ball took off his legs,
So he laid down his arms.

A pun can be used seriously; there are several examples in Shakespeare.

Rhetoric. The term designates the art of persuasive or effective speech, written as well as oral. Facts and ideas are emphasised in clear, convincing, and attractive language.

Rhyme is the use at the end of lines of verse of words with the same sounds.

Rhythm is regular recurrence of accent in verse.

Romance is fictitious tale which goes beyond the limits of real life.

Satire is a literary verse or prose, the purpose of which is to ridicule or censure social or political abuses. The

technique employs irony, wit, mockery and humour.

Scanning a poem means examining a verse to find the metre.

Simile (L. *similis:* like) is something similar. It is a comparison to illustrate anything. Two things or actions are likened to each other for clearness or for the poetical effect.

Sonnet. A poem of fourteen lines devoted to a single incident, thought or emotion. The metre is iambic pentameter. The first eight lines are called the *octave* and the last six lines the *sextette.* At first, it was introduced from Italy and contained two rhymes only.

Stanza. A stanza is a number of lines of verse rhyming as a unit. It is a division of a poem.

Suffix, an affix attached to the end of a word: *e.g.* *-ness, ship, -able* in the words 'firmness', 'statesmanship', 'commendable'.

Synonyms are words that are much the same in meaning and use: *e.g.*, beautiful, handsome, good-looking, breakable, fragile, frail.

Syntax is that part of grammar that deals with the way words are arranged in sentence.

Tautology is unnecessary repetition: *e.g.*, 'I have been *all alone by myself* for hours'.

Zeugma, *e.g.*, 'He was kicking the football with determination and his left foot'. 'She lost her spectacles and her temper'.

Chapter 3

AUTHORS AND THEIR WORKS

Sec. I. English Literature

Arnold, Sir Edwin (1832-1904). The Light of Asia. The Light of the World.

Arnold, Matthew (1822-1888). Culture and Anarchy. The Scholar Gipsy, Literature and Dogma, God and the Bible, Sohrab and Rustam.

Austen, Jane (1775-1817). Pride and Prejudice, Sense and Sensibility, Persuasion, Emma.

Bacon, Francis (1561-1626). The Wisdom of Ancients, Novum Organum, The Advancement of Learning.

Bennet, Arnold (1867-1931). Burned Alive, The Old Wives' Tales, Milestones.

Blake, William (1757-1827). Songs of Experience.

Burke, Edmund (1729-1797). Reflections on French Revolution, On the Sublime and Beautiful, A Vindication of Natural Society.

Cecil (Lord). **David** (1902 — —). Early Victorian Novelists, The Stricken Deer, The Young Melbourne.

Carlyle, Thomas (1795-1881). A historian and prose-writer. Past and Present, Heroes and Hero-worship, French Revolution, Letters and Speeches of Oliver Cromwell.

Chaucer, Geoffrey (1344-1400). Canterbury Tales.

Coleridge, Samuel Taylor (1772-1834). Kublai Khan, Table Talk, Biographia Literari, Ancient Mariner, Christabel, Lyrical Ballads.

Collins, Wilkie (1824-1889). The Moonstone.

Darwin, Charles Robert (1809-1882). The Origin of Species, The Expression of Emotion of Man and Animal.

Defoe, Daniel (1661-1731). Robinson Crusoe.

Dickens, Charles (1812-1870). Pickwick Papers, David Copperfield, Tale of Two Cities, The Battle of Life, Hard Times, Great Expectations, Oliver Twist.

Dryden, John (1631-1700). Annuns Mirabilis, The Rival Ladies, Essay on Dramatic Poetry.

Eliot, T. S. (1888——), Bante, Murder in the Cathedral, Homage to John Dryden, The Waste Land.

Evans, Mary Anne (George Eliot); (1819-1880). Adam Bede, The Mill on the Floss, Daniel Deronda.

Galsworthy, John (1869-1933). Strife, Justice, Castle in Spain, Caravan, A Man of Property, Collected Plays, A Modern Comedy, The Forsyte Saga.

Goldsmith, Oliver (1728-1774). The Traveller, The Good-Natured Man, Deserted Village, The History of Greece, Animated Nature, Vicar of Wakefield.

Hardy, Thomas (1840-1928). Collected Poems, Desperate Remedies, Satires of Circumstance, Under the Greenwood Tree, A Pair of Blue Eyes, Far From the Madding Crowd.

Hazlitt, William (1778-1830). Napoleon Bonaparte, The Spirit of the Age, Essay on the Principles of Human Act, On the English Poets.

Hudson, W. H. (1841-1922). Green Mansions.

Huxley, Aldous (1894——). Point Counter Point, Brave New World.

Irving, Washington (1783-1859). Tales of a Traveller, History of the Life and Voyages of Columbus, Legends of the Conquest of Spain, The Sketch Book.

Johnson, Samuel (1709-1784). The Vanity of Human Wishes, Lives of Poets, English Dictionary.

Kant, Immanuel (1724-1804). A Critique of Pure Reason.

Karl Marx (1818-1883). Das Kapital.

Keats, John (1795-1821). Isabella, Ode to the Nightingale, The Grecian Urn, Endymion, Eve of St. Agnes.

Kipling, Rudyard (1865-1936). The Light that Failed, Plain Tales from the Hills, Jungle Tales, Something of Myself.

Lamb, Charles (1775-1834). The Adventures of Ulysses, Tales from Shakespeare, Essays of Elia.

Lawrence, Thomas Edward (1888-1935). Revolt in the Desert, The Seven Pillars of Wisdom.

Longfellow, H. W. (1807-82). A Psalm of Life, Excelsior, The Golden Legend, The Village Blacksmith, The Slave's Dream.

Macaulay (1800-1859). History of England.

Masefield, John (1876——) 'Poet-laureate'. The Everlasting Mercy, Pompey the Great, Lost Endeavour, Grim Davis, Dauber.

Milton, John (1608-1674). Paradise Lost, Paradise Regained, The Doctrine and Discipline of Divorce, On the Death of a Fair Infant, Lycidas.

Plato (429-347 B.C.). Dialogues: Republic.

Pope, Alexander (1688-1744). The Temple of Fame, Elegy on an Unfortunate Lady, Essay on Man, Essay on Criticism.

Plutarch (46-120). Parallel Lives.

Rosseau, Jean-Jacques (1712-28). Julie, Emile, Confessions, The Social Contract.

Ruskin, John (1819-1900). Modern Painters, The Seven Lamps of Architecture. Sesame and Lilies, Lectures on Architecture and Painting, Munera Pilveris, Stones of Venice.

Scott, Sir Walter (1771-1832). Ivanhoe, The Pirate, The Lay of Last Minstrel, The Lady of the Lake, Old Morality.

Shakespeare, William (1564-1616). Some of his important plays are: Comedy of Errors, As You Like It, Hamlet, Othello, Romeo and Juliet, Merchant of Venice, Macbeth, Midsummer Night's Dream, Tempest.

Shaw, George Bernard (1856-1950). Man and Superman, The Sanity of Art, Plays Pleasant and Unpleasant, Three Plays for Puritans, A Political Extravaganza, The Intelligent Women's Guide to Socialism and Capitalism. The Irrational Knot, Love among the Artists, St. John.

Shelley, Percy Bysshe (1792-1822). The Cenci, Julian and Maddalo, Hellas, Adonais, Queen Mab, Prometheus Unbound, The Revolt of Islam.

Stevenson, Robert Louis (1850-1894). The Arabian Nights, An Inland Voyage, Treasure Island, The Merry Men, The Black Arrow.

Tennyson, Alfred (1809-1892). Idylls of the King, The Two Voices, The Promise of May, The Lover's Tale, The Revenge, In Memoriam.

Thackeray, William Makepeace (1811-1863). Vanity Fair, The Rose and the Ring, The Adventures of Philip, Henry Esmond.

Tolstoy, Count Leo (1828-1910), War and Peace, Resurrection. The Power of Darkness, The End of the Age, Childhood.

Wells, H. G. (1866-1946). The Wheels of Chance, Kipps, The Time Machine, The Invisible Man, The War in the Air, Marriage, The Outline of History, The Work, the Wealth and Happiness of Mankind, The Shape of Things to Come, Kipps.

William Charles (1886——). The Silver Star, Widows of Night, A Myth of Shakespeare.

Wordsworth, William (1770-1850). Ode to Duty, Prelude, Intimations on Immortality, Solitary Reaper, The Excursions, Lyrical Ballads.

Sec. II. Urdu Literature

Adam, Abdul Hameed. Pech-o-Kham, Kharabat, Zulf-i-Pareshan.

Agha Hashar Kashmiri. Asir-i-Hirs, Turki Hoor, Sita Ban Bas, Khubsurat Bala, Pehla Piyar.

Ahmad Nadim Qasimi. Ablay, Bagulay, Tulu-o-Ghurub, Anchal, Aas Pass, Jalal-o-Jamal.

Akbar Hussain Akbar, Khan Bahadur (1846-1921). Kulliyat.

Akhtar Shirani. Subh-i-Bahar, Lala-i-Tur, Tuyur-i-Awarah, Shahnaz, Salma-i-Akhtar, Akhtaristan.

Ashiq Batalvi, Soz-i-Natuwan. Shakhsaar.

Asmat Chughtai. Ek Bat, Choten, Kalyan, Terhi Lakeer.

Azad, Muhammad Hussain (1830-1910). Darbar-i-Akbari, Ab-i-Hayat, Nairang-i-Khayal, Sukhandan-i-Pars, Khwab-i-Amn, Shab-i-Qadr, Subh-i-Ummid, Abr-i-Karam, Nazm-i-Azad.

Bokhari, A. S. Mazamin-i-Pitras.

Dagh, Nawab Mirza Khan (1831-1905). Aftab-i-Dagh, Mahtab-i-Dagh, Gulzar-i-Dagh, Faryad-i-Dagh.

Faizi. (Persian) Kulliyat, Talism-i-Hosh Ruba.

Firdausi. (Persian) Shahnamah.

Ghalib, Asad Ullah Khan (1787-1869). Diwan-i-Ghalib, Ood-i-Hindi, Urdu-i-Mualla.

Hafeez Jullundhari (b. 1900). Shahnama-i-Islam, Naghma-i-Zar, Soz-o-Saz, Haft Paikar.

Hali, Altaf Hussain, Shams-ul-Ulama (1837-1914). Musaddas-i-Hali, Diwan-i-Hali; Madd-o-Jazr-i-Islam, Muqaddama-i-Sh'ir-o-Sha'iri, Hayat-i-Jawaid, Hayat-i-Sa'di, Yadgar-i-Ghalib.

Hasrat Mohani, Fazl-ul Hasan (1875-1951). Arbab-i-Sakhun, Kulliyat-i-Hasrat, Nukat-i-Sakhun.

Ibrahim Jalees, Kuchh Gham-i-Dauran Kuchh Gham-i-Janan, Chalis Crore Bhikari.

Ihsan Danish. Nawa-i-Kargah, Roshanian, Zakhm-o-Marham, Atash-i-Khamosh.

Insha, Insha Allah Khan (d. 1817). Diwan-i-Insha, Masnawi-Shikar Nama Ka'ani (Persian), Qasidah, Subh.

Iqbal, Muhammad Iqbal, Dr. Sir (1875-1938). Poet, Politician, Philosopher. He dominated for nearly a decade not only the literary domain of our vast sub-continent but coloured by his powerful thought the social and poetical ideology of more than one generation of Indian Muslims. He created the idea of a separate Muslim homeland in India which later came to fruition in the establishment of Pakistan. Dr. Iqbal preached Pan-Islamism in religion and politics. He expanded and enriched the scope and content of his native

poetic literature by the varied and prolific product of his massive genius.

His works comprise: Bang-i-Dara, Asrar-o-Rumuz, Payam-i-Mashriq, Zubur-i-Ajam, Javed Namah, Bal-i-Jibreel, Zarb-i-Kaleem, Armughan-i-Hijaz, The Reconstruction of Thought in Islam, Asrar-e-Khudi, Rumuz-e-Bekhudi, Shikwah, Jawab-i-Shikwah, Pas Cheh Bayed Kard.

Jigar Muradabadi. Shu'la-i-Toor.

Josh, Malihabadi. Hayat-o-Naghmat, Shu'la-o-Shabnam, Sha'ir ki Raaten, Saif-o-Subu, Arsh-o-Farsh.

Josh, Shabbir Hussain, Ruh-i-Adab, Naqsh-o-Nigar.

Krishan Chandar. Ham Wahshi Hain, Nazzarey.

M. Aslam. Raqqasah, Rain Nazzarey, Paigham-i-Sarosh, Sharabi, Jam-i-Shikastah, Raqs-i-Iblees, Ashk-i-Nadamat.

Mnuto, Saadat Hassan. Munto ke Mazamin, Munto ke Afsaney, Gorki ke Afsaney, Talaq, Tursh, Shireen.

Mirza Adib. Sahra Naward ke Khatut, Andha Dewta.

Momin Khan Momin (1800-1851). Diwan-i-Momin.

Naseem Hejazi. Khak-o-Khoon, Insan aur Dewta, Dastan-i-Mujahid, Akhri Chatan, Shaheen, Yusuf bin Tashqin, Muhammad bin Qassim, Moazzam Ali, Talwar Tut Gai.

Nazir Ahmad, Shams-ul-Ulema (1831-1912), Mir'at-al-Urus, Banat-un-Na'sh, Tauba-tun-Nusuh.

Niaz Fatehpuri. Shihab ki Sarguzasht, Nigaristan, Jamalistan.

Prem Chand (1880-1936). Novels and Stories: Prema, Jalwa-i-Isar, Bazar-i-Husn, Prem Pachisi, Soz-i-Watan, Khak-i-Parwana, Prem Battisi, Prem Chalisi, Chaugan-i-Hasti, Gosha-i-Afiat, Khwab-o-Khayal.

Rashid Akhtar Nadvi. Pandrah August, Aurangzeb.

Sayyed Ahmad, Sir, (1817-1898). Asar-es-Sanadid Silsila-i-Muluk-i-Hind, Wafadar, Musalmanan-i-Hind, Asbab-i-Baghawat.

Sardar Ja'fari. Nai Dunya ko Salam, Khuni Lakeer.

Sauda, Mirza Muhammad Rafi (1713-1781). Diwan-i-Sauda.

Shafiq-ur-Rehman. Shagufay, Lahren, Madd-o-Jazr, Parwaz, Himaqaten.

Shaukat Thanawi. Ghizalah, Insha' Allah.

Sharar, Abdul Halim (1861-1926). Urdu novelist, Ayyam-i-Arab—a historical novel, Husn ka Daku, Life of Abu Bakr Shibli, Review of Gulzar-i-Nasim, a History of Sind, Bahisht-i-Barin.

Shibli Nu'mani, Allama (1857-1914). Sh'ir-ul-'Ajam, Sirat-un-Nabi—Biography of the Holy Prophet; Biographies of Hazrat Omar, Maulana Rum and Emperor Aurangzeb, Mawazna-e-Anis-o-Dabir.

Sarshar, Ratan Nath Dar (1846-1902). Fasana-i-Azad, Sair-i-Kohsar, Jam-i-Sarshar, Khudai Faujdar, Karamdham, Bichari Dulhan, Tufan-i-Bad-tamizi.

Taj, Imtiaz Ali. Sanobar ke Saey, Zalim Muhabbat, Anarkali.

Umar Khayyam. (Persian) Rubaiyat.

Zauq, Sh. Muhammad Ibrahim (1789-1854). Khaqani-i-Hind (Poet-laureate). Diwan-i-Zauq.

Sec. III. Persian Literature

Ameer Khusro Dehlavi "Tooti-i-Hind" (605-725 Hijri). Dewan, Masnavi Manaaqib-i-Hind, Shireen-Khusro, Hasht Bahisht, Leila-Majnun, Tughlak Nama (and about 75 other works).

Anwari, Muhammad Ahad-ud-Din (500-582 Hijri) Kulliat-i-Anwari.

Assadi Tusi, Ali Bin Ahmad (5th century Hijri). Lughat-i-Farsi, Garshasep Namah.

Attar, Khwaja Farid-ud-Din (513-627 Hijri). Diwan-i-Ghazliyat, Tazkirah-tul-Auliya, Jawahir-ul-Lazzat, Israr Namah, Elahi Namah, Wasiyyat Namah, Bulbul Namah, Haider Namah, Shutr Namah, Mukhtar Namah, Mantiq-ul-Tair.

Aufi Muhammad Aufi, Yazdi (7th century Hijri), Lub-o-Lubab.

Auj, Mirza Muhammad Jafar. Miqyas-ul-Ash'ar.

Be-dil, Mirza. Diwan-i-Mirza Be-dil.

Daqeeqi, Abu Mansur Bin Ahmad (d. 341 Hijri). Masnavi, Diwan-i-Daqeeqi, Shahnamah.

Faizi. Kulliyat-i-Faizi, Talism Hosh Ruba.

Faqir Shams-ud-Din, Faqir (12th century Hijri). Hadeeqah-tul-Balaghat.

Firdausi, Abul Qasim Mansur, Tusi (322/323-411 Hijri). Shahnamah-i-Firdausi.

Ghalib, Mirza Asadulla Khan, "Najm-ud-Daula" (1797-1869). Ghazliyat-i-Ghalib, Kulliyat-i-Farsi, Kulliyat-Nasr-i-Farsi.

Hafiz Sheerazi, Shams-ud-Din, Khwaja (715-791 Hijri). Diwan-i-Hafiz, Masnavi, Ghazliyat.

Iqbal, Dr. Sir Muhammad Iqbal, Allama. (1875-1938). Armughan-i-Hidjaz, Pas Cheh Bayed Kard.

Insha, Insha Allah Khan (d. 1817). Masnavi-i-Shikar, Namah-i-Ka'ani.

Kemal Ismail, Ispahani (569-635 Hijri). Diwan, Kulliyat-i-Ismail.

Makhfi. Diwan-i-Makhfi.

Manu Chehri, Abu Najm, Ahmed (d. 424 Hijri). Diwan.

Mohaqqiq Tusi, Naseer-ud-Din Khwaja (597-672 Hijri). Mi'yar-ul-Ash'ar.

Nazeeri Naishapuri, Muhammad Hussain (d. 1020 Hijri). Ghazliyat-i-Nazeeri, Persian Masnavi.

Nizami Aruzi Samarqandi (6th century Hijri). Chahar Maqalah.

Nizami Ganjvi, Ilyas Bin Yusuf (535-606 Hijri) Masnavi Makhzan-i-Israr, Masnavi Shireen Khusro, Masnavi Laila Majnun, Masnavi Haft Paikar, Masnavi Sikandar Namah.

Omar Khayyam (435-518 Hijri). Ruba'iyat-i-Khayyam.

Qa'ani, Mirza Habib Ullah Sherazi, "Malak-ul-Shu'ara" (1212-1270 Hijri). Kulliyat-i-Hakeem Qa'ani.

Raudki, Abu Abdullah Jafar (d. 329 Hijri). Kalilah-o-Damnah, Ghazliyat-i-Raudki, Diwan-i-Raudki.

Rumi, Maulana Jalal-ud-Din (604-672 Hijri). Masnavi-i-Maulana Rum.

Saadi Sheerazi, Sh. Sharaf-ud-Din, Muslih-ud-Din (589-691 Hijri), Kulliyat-i-Saadi, Gulistan, Bostan, Sannahia, Muzhikat, Hazliyat.

Sa'ib. Diwan-i-Sa'ib.

Sanai, Hakeem Abu Majd Majdud (465-535 Hijri) Kulliyat-i-Sanai, Karnamah-i-Balkh, Hadeeqah-tul-Haqiqat (Hadeeqah-i-Sanai), Ishaq Namah, Tareeq-ut-Tahqiq. Sair-ul-Abad.

Seena, Bu Ali (9th century Hijri). Kitab-i-Shifa.

Unsari, Hasan Bin Ahmad, "Malak-ul-Shu'ara." (d. 431 Hijri). Qasaid-i-Unsari, Wamiq-o-Azra, Diwan-i-Unsari.

Sec. IV. Bengali Literature

Bankim Chandra Chatterjee. Bande Matram, Kapal Kundala, Sitaram, Indira, Durgesa-Mandini, Aanda Math.

Budhbadev Basu. Bandir Bandana.

Bannerjee, H.C. Vipra Samhar.

Chandra Sheikhar. Adrash Liala.

Jasim-ud-Din. Nakshikanthar Math.

Kalidas Roy. Brajavenn, Parnaput.

Nazrul Islam. Dolon Champa, Agni Vina.

N. C. Ghosh. Raibatak, Palasir Juddha.

Roy, D. L. Chandra Gupta, Nurjahan, Shahjahan.

Tagore, Rabindranath, Dr. Gitanjali, Bisarjan Natir, Puja, Raja Rani, Rakhta Karavi, Gora, Balak, Soner Tari Shishu Katha-o-Kahani, Kheya, Palataka, Kumudini Dr. Ankh ki Khirki.

Sec. V. Hindi Literature

Devika Nandan Khatri, Narendra Mohini, Kusuma Kumari, Chandra Kanta, Santuti, Bhutnath.

Jaya Sankara Prasada. Ajata Satru, Chandragupta Sakand Gupta, Prayas Chitta.

K. M. Munshi. Bhawan Parasurama, Lomhrasini, Rajadhiraj Jaisomnath.

Kabir. Kabir Bijak, Kabir Vachnamrit.

Lal Kavi. Chhatra-Prakas.

Premchand. Karbala, Sangrama.

Radhes hyam. Usa Anirudh Savana Kumar, Parivartan

Rahim. Rahim Ratnavli.

Tulsi Das. Vinava Patrika, Rama Charita Manas Gitavali, Kavitavali.

Sarivastavan, G. P., Sahib Bahadur, Mardana Aurat.

Sur Das. Sur-sagar.

Sec. VI. Greatest Poets

Language	*Poet*
Bengali	Rabindranath Tagore
English	Shakespeare
German	Goethe
Greek	Homer
French	Sully Prudhonmme
Italian	Dante
Persian	Saadi
Sanskrit	Kalidas
Urdu	Iqbal

Chapter 4

FAMOUS WORKS AND THEIR AUTHORS

Works	*Authors*
Ab-i-Hayat	Azad, Muhammad Hussain
Adam Bede	George Eliot.
Adonias	Shelley
Æneid	Virgil.
Age of Reason	Thomas Baine.
Alice in Wonderland	Lewis Carroll.
All's Well That End's Well	Shakespeare.
Analysis of the Human Mind	James Mill. ·
Ancient Mariner	Coleridge.
Amelia	Henry Fielding.
Anna Karenina	Tolstoy.
Antony and Cleopatra	Shakespeare.
As You Like It	Shakespeare.
Armughan-i-Hedjaz	Dr. Muhammad Iqbal.
As We Were	Benson.
Asrar-i-Khudi	Iqbal.
Asrar-o-Rumuz	Iqbal.
Bal-i-Jibreel	Iqbal.
Banat-un-Na'sh	Nazir Ahmad.
Bande Matram	B. C. Chatterjee.
Bang-i-Dara	Iqbal.
Battle of the Books	Swift.
Beyond the Horizon	Eugene O'Neill.
Beyond Good and Evil	Friedrick Wilhelm Nietzsche.
Biographia Literaria	S. T. Coleridge.
Break, Break, Break	Tennyson.
Bride of Abydos	Lord Byron.
Bride of Time	Naidu, Sarojini.
Bostan	Saadi Shirazi.
Bride of Lammermoor	Sir Walter Scott.
Buoyant Billions	G. Bernard Shaw.
Dance of Death	Wystan Hugh Auden.
Dance of Life	Havelock Ellis.

Works	*Authors*
Darbar-i-Akbari	Azad, Muhammad Hussain.
Diwan-i-Zauq	Zauq, Muhammad Ibrahim.
Das Kapital	Karl Marx.
David Copperfield	Dickens.
Dead Souls	Gogol.
Decline and Fall of the Roman Empire	Gibbon.
Deserted Village	Goldsmith.
Dialogues	Plato.
Divine Comedy	Dante (Italian)
Diwan-i-Ghalib	Ghalib.
Don Quixote	Cervantes (Spanish)
Dr. Jekyll and Mr. Hyde.	Stevenson.
Dynasts	Thomas Hardy.
Ego	James Agate.
Egoist	George Meredith.
Emma	J. Austen.
Ellia	Charles Lamb.
Endymion	Keats.
Epigram	Robert Owen.
Essays of Elia	Charles Lamb.
Essay on Criticism	Alexander Pope.
Essay on Man	Alexander Pope.
Faerie Queene	Spenser.
Far Fetched Fables	G. Bernard Shaw.
Far From Madding Crowd	Thomas Hardy.
Fasana-i-Azad	Sarshar, Rattan Nath.
Father and Son	Edmund Gosse.
Faust	Goethe.
Flower and the Leaf	John Dryden.
French Revolution	Thomas Carlyle.
Gallipoli	John Masefield.
Gitanjali	Rabindranath Tagore.
Golden Bowl	Henry James.
Golden Threshold	Naidu, Sarojini.
Gulistan	Saadi Sheerazi.
Gulliver's Travels	Swift.
Hamlet	Shakespeare.
Hard Times	Charles Dickens.
Hazliyat	Saadi Sheerazi.

Works	*Authors*
Heaven and Earth	Byron.
Heroes and Hero-worship	Carlyle.
Idle Thoughts of an Idle Fellow	Jerome Klapka.
Idylls of the King	Tennyson.
Iliad	Homer.
Inquiry into the Nature and Cause of the Wealth of Nations.	Adam Smith.
In Memoriam	Tennyson.
Into Battle	Winston Churchill.
It is Never Too Late to Mend	Charles Reade.
Ivanhoe	Scott.
Julius Caesar	Shakespeare.
Joan of Arc	G. B. Shaw.
Jean Christopher	Romain Rolland.
Jungle	Upton Sinclair.
Jungle Book	Rudyard Kipling.
Kidnapped	R. L. Stevenson.
Kim	Rudyard Kipling.
Kipps	H. G. Wells.
King Lear	Shakespeare.
Kulliyat (Persian)	Faizi.
Kulliyat (Urdu)	Akbar Hussain.
Lady of the Lake	Sir Walter Scott.
Last Days of Pompeii	Bulwer Lytton.
Life of Napoleon Bonaparte	Abbot.
Life of Nelson	Southey.
Light of Asia	Sir Edwin Arnold.
Life's Little Oddities	Robert Lynd.
L'Allegro	John Milton.
Love's Cure	Beaumont and Fletcher.
Love's Labour's Lost	Shakespeare.
Love's Philosophy	P. B. Shelley.
Lub-ul-Lubab	Muhammad Aufi
Macbeth	Shakespeare.
Man and Superman	G. B. Shaw.
Man of the World	Henry Mackenzie.

Works	*Authors*
Maud	Tennyson.
Masnawi	Maulana Rum.
Masnawi	Hafiz Tabrizi.
May Fair	Michael Arlen.
Measure for Measure	Shakespeare.
Mein Kemph	Adolf Hitler.
Merchant of Venice	Shakespeare.
Midsummer Night's Dream	Shakespeare.
Mir'at-ul-Arus	Nazir Ahmad.
Mi'yar-i-Ash'ar	Mohaqqiq Tusi.
Mother India	Katherine Mayo.
Mourning Bridge	William Congreve.
Much Ado About Nothing	Shakespeare.
Muqaddama-i-Shi'r-o-Shai'ri	Hali, Altaf Hussain.
Musaddas-i-Hali	Hali, Altaf Hussain.
Naqsh-i-Faryadi	Faiz Ahmad Faiz.
Nakshikanthar (Bengali)	Jasim-ud-Din.
Nairang-i-Khayal	Azad, Muhammad Hussain.
New Arabian Nights	R. L. Stevenson.
Notes from Gallows	Julius Fucik.
Novum Organum	Francis Bacon.
Ode to Independence	Tobias George Smollett.
Ode to Nightingale	Keats.
Ode to West Wind	Shelley.
Odyssey	Homer.
On Going a Journey	Hazlitt.
Origin of Species	Charles Darwin.
Othello	Shakespeare.
Outline of the History of the World	H. G. Wells.
Paradise Lost	Milton.
Paradise Regained	Milton.
Passionate Friends	H. G. Wells.
Payam-i-Mashriq	Iqbal.
Persian Masnawi	Nazeeri, Muhammad Husain.
Pickwick Papers	Charles Dickens.
Pilgrim's Progress	John Bunyan.
Pleasant and Unpleasant	G. B. Shaw.
Pride and Prejudice	Jane Austen.

Works	*Authors*
Progress and Poverty	Henry George.
Progress of Error	William Cowper.
Professor, The	Charlotte Bronte.
Republic	Plato.
Resurrection	Tolstoy.
Revolutions and Independence	William Wordsworth.
Retaliation	Goldsmith.
Rights of Man	Thomas Paine.
Rime of the Ancient Mariner	Coleridge.
Rip Van Winkle	Washington Irving.
Road to Freedom	Bertrand Russell.
Road to Survival	William Vogt.
Robinson Crusoe	Daniel Defoe.
Romeo and Juliet	Shakespeare.
Rubaiyat of Omar Khayyam	Edward Fitzgerald.
Scholar Gipsy, The	Matthew Arnold.
Sense and Sensibility	Jane Austen.
Seven Pillars of Wisdom	John Ruskin.
Seven Seas, The	Rudyard Kipling.
Shahnamah	Firdausi.
Shahnama-i-Islam	Hafeez Jullunduri.
Ship of Fools, The	Alexander Barclay.
Shikwah	Iqbal.
Shi'r-ul-'Ajam	Shibli Nu'mani.
Slave of Solitude	Patrick Hunter.
Social Contract	Rousseau.
Sorrows of Satan, The	Marie Corelli.
Spirit of the Age, The	Hazlitt.
Studies in Psychology of Sex	Havelock.
Sunshine and Shadows	Victor Hugo.
Tales from Shakespeare	Charles Lamb.
Tale of Two Cities	Charles Dickens.
Tales of Unrest	Joseph Canvas.
Talism-i-Hosh Ruba	Faizi
Tauba-tun-Nusuh	Nazir Ahmad.
Tazkirah	Al-Mashriqi, Inayatullah Khan.
Tazkira-tul-Auliya	Attar, Khwaja Farid-ud-Din
Tempest	Shakespeare.
Testament of Beauty, The	Robert Bridges.

Works	*Authors*
Three Graves, The	S. T. Coleridge.
Time Machine	Herbert George Wells.
To a Skylark	Wordsworth.
Top Secret	Henry Fielding.
Travels in Arabian Desert	C. M. Doughty.
Treatise of Human Nature	Hume.
Treasure Island	R. L. Stevenson.
Try and Try Again	W. E. Hickson.
Twelfth Night; or What You Will.	Shakespeare.
Two on a Tower	Thomas Hardy.
Tyrannic Love	John Dryden.
Unfortunate Traveller	Thomas Nash.
Ulysses	Alfred Tennyson.
Universal Passion, The	Edward Young.
Universal Prayer, The	Alexander Pope.
Urdu-i-Mualla	Ghalib, Asadullah Khan.
Utopia	Sir Thomas Moore.
Unto This Last	John Ruskin.
Vagabond, The	R. L. Stevenson.
Vanity Fair	W. M. Thackeray.
Vanity of Human Wishes	Dr. Samuel Johnson.
Vinaya Patrika (Hindi)	Tulsi Das.
Voyage of Lilliput, A	J. Swift.
War and Peace	Tolstoy.
Water Babies, The	Charles Kingsley.
Waverly	Sir Walter Scott.
Way of the World, The	Congreve.
Westward Ho!	Charles Kingsley.
Where Are We Heading?	Summer Wells.
Whiteman's Burden, The	Rudyard Kipling.
Wide, Wide, World, The	Susan Warner.
Withering Heights	E. Bronte.
Winter Evening	William Cowper.
Yadgar-i-Ghalib	Hali.
Zarb-i-Kaleem	Iqbal.
Zubur-i-'Ajam	Iqbal.

Chapter 5

SOME QUOTATIONS: WHO WROTE?

1. There is a tide in the affairs of men,
Which, taken at the flood, leads on to fortune:
Omitted all the voyage of their life,
Is bound in shallows and in miseries.
—William Shakespeare: *Julius Caesar.*

2. The glories of our blood and state,
Are shadows, not substantial things;
There is no armour against fate;
Death lays its icy hands on kings;
—Shelley: *Death the Leveller.*

3. Reading maketh a full man, conference a ready man, and writing an exact man.
—Bacon: *Of Studies.*

4. "More things are wrought by prayer than this world dreams of." —Lord Tennyson.

5. "Great things are done when men and mountains meet;
This is not done by jostling in the street."
—William Blake.

6. "If you begin arguing with a woman you're lost."
—Andre Gide.

7. Some are born great, some acquire greatness, and some have greatness thrust upon them.
—Shakespeare: *Twelfth Night.*

8. Histories make the men wise; poets witty, the mathematics subtle; natural philosophy, deep moral, grave; logic and rhetoric, able to contend.
—Bacon: *Of Studies.*

9. Lives of great men all remind us
We can make our lives sublime......
—Longfellow: *A Psalm of Life.*

10. Honour and shame from no condition arise;
Act well your part, there all the honour lies.
—Pope: *Essay on Man.*

11. I am the master of my fate
I am the captain of my soul.
—Henley: *Unconquered.*

12. And how can man die better
Than facing fearful odds,
For the ashes of his fathers,
And the temples of his gods?
—Macaulay: *Horatius.*

13. Sweet are the uses of adversity,
Which, like the toad, ugly and venomous,
Wears yet a precious jewel in his head.
And this our life exempt from public haunt
Find tongues in trees, books in running brooks,
Sermons in stones and good in everything.
—William Shakespeare: *As You Like It.*

14. There is but one law for all, namely, that law which governs all law, the law of our Creator, the law of humanity, justice, equality—the law of nature and of nations.
—Edmund Burke: *Impeachment of Warren Hastings.*

15. The old order changeth, yielding place to new,
And God fulfils Himself in many ways
Lest one good custom should corrupt the world.
—Alfred Tennyson: *The Passing of Arthur.*

16. Life is real! Life is earnest!
And the grave is not its goal.
Dust thou art, to dust returnest,
Was not spoken of the soul.
Not enjoyments, and not sorrow,
Is our destined end or way!
But to act, that each tomorrow
Finds us farther than today.
—Henry Wordsworth Longfellow: *A Psalm of Life.*

17. We are the music makers,
And we are the dreamers of dreams.
—Arthur William Edgar o' Shaughnessy: *We are the Music Makers.*

18. To be, or not to be, that is the question;
Whether 'tis noble in the mind to suffer,
The slings and arrows of courageous fortune,
Or to take arms against a sea of troubles,
And by opposing end them?......
—William Shakespeare: *Hamlet.*

19. How sleep the brave, who sink to rest,
By all their country's wishes blest.
—William Collins: *Ode Written in the year* 1746.

20. Ah, Love! could thou and I with Fate conspire
To grasp this sorry scheme of things entire.
Would not we shatter it to bits and then
Remould it nearer to that Heart's desire.
—Omar Khayyam: *Rubaiyat.*

21. Self-reverence, self-knowledge, self-control,
These three alone lead life to the sovereign power.
—Alfred Tennyson: *Oenone.*

22. The lunatic, the lover, and the poet,
Are of imagination all compact:
One sees more devils that vast hell can hold.
—Shakespeare: *A Midsummer Night's Dream.*

23. Defer not till tomorrow to be wise
Tomorrow's sun to thee may never rise.
—Congreve: *Letter to Cobham.*

24. The world's a bubble and the life of man less than a span.
—Bacon: *The World.*

25. The man that hath no music in himself,
Nor is not moved with concord of sweet sounds,
Is fit for treasons, stratagems and spoils.
—Keats: *Endymion.*

26. Brevity is the soul of wit.
—Shakespeare: *Hamlet.*

27. With malice towards none; with charity for all; with firmness to the right, as God gives us to see the right.
—Abraham Lincoln: *Inaugural Address.*

28. Drive my dead thoughts over the universe,
Like withered leaves to quicken a new birth
If winter comes, can spring be far behind?
—Percy Bysshe Shelley: *Ode to the West Wind.*

29. An orphan's curse would drag to hell
A spirit from on high;
But oh! more horrible than that
Is a curse in a dead man's eye!
—Coleridge: *The Rhyme of Ancient Mariner.*

30. And not by eastern winds only,
When daylight comes, comes in the light,
In front, the sun climbs slow, how slowly,
But westward, look the land is bright.
—Arthur Hugh Clough: *Say Not the Struggle Naught Availeth.*

31. The One remains, the many change and pass;
Heaven's light for ever shines, Earth's shadows fly;
Life, like dome of many-coloured glass,
Stains the white radiance o' Eternity.
—Percy Bysshe Shelley: *Adonais.*

32. Are God and Nature then at strife,
That Nature lends such evil dreams?
So careful of the type she seems,
So careless of the single life.
—Alfred Tennyson: *In Memoriam.*

33. Charmed magic casements, opening on the foam
Of perilous seas, in faery lands forlorn.
—John Keats: *Ode to Nightingale.*

34. Heard melodies are sweet, but those unheard,
Are sweeter; therefore, yet soft pipes, play on;
Not to the sensual ear, but more endeared,
Pipe to the spirit ditties of any tone.
—Percy Bysshe Shelley: *On a Grecian Urn.*

35. He prayeth best who loveth best,
Both man and beast and bird.
—*Coleridge.*

36. My crown is my heart, not on my head,
Nor decked with diamonds and Indian stones,

Nor to be seen, my crown is called content,
A crown it is, that seldom kings enjoy.

—*Shakespeare.*

37. Just are the ways of God,
And justifiable to men,
Unless there be who think not God at all.

—*Milton.*

38. They are slaves who fear to speak
For the fallen and the weak;
They are slaves who will not choose
Hatred, scoffing, and abuse,
Rather than in silence shrink
From the truth they need must think;
They are slaves who dare not be
In the right with two or three.

—*Southey.*

39. What is on earth,
Nay, under heaven, continues at a stay?
Ebbs not the sea, when it hath overflowed,
Follows not darkness when the day is gone?
And see me not sometimes the eye of heaven
Dimmed with o'erflowing clouds? There is not that work.
Of careful nature, of cunning art,
How strong, how beauteous, or how rich it be,
But falls in time to ruin.

—*Shakespeare.*

40. The heights of great men reached and kept
Were not attained by sudden flight,
But they while their companions slept,
Were toiling upward in the night.

—*Longfellow.*

PART VI

CONSTITUTIONAL, DIPLOMATIC AND POLITICAL TERMS

CONSTITUTIONAL, DIPLOMATIC AND POLITICAL TERMS

Abdication. Renunciation of an office, usually throne, by a ruler whether voluntarily or under compulsion.

Absolutism. The system of unlimited government, the governed having no representation, vote or other share in the administration of the country. The dictatorial or "leader" states of our times are the modern type of absolutism.

Activism. A term used by political groups who want to distinguish themselves as taking active steps towards their proposed aim, from those who merely proclaim it as a programme.

Acta Final or Act Final. A formal summary of statement of proceedings of a conference drawn up at the end of its meeting for the sake of convenience. Other terms for such a summary are 'acte protocol', 'proce's verbal final'.

Ad Hoc Committee. A committee which is formed for a specific object as and when the necessity arises.

Adjournment. Postponement of the meeting of a legislative body until another fixed time.

Administrative Law. Prevails on the continent of Europe, wherebypublic officers are subject to separate law and procedure from private individuals. These laws are a special feature of the British Constitution.

Ad Referendum. It means 'subject to the approval of my government'. Whenever a representative of a government accepts a proposition in anticipation of approval of his government, such an acceptance is "ad referendum".

Agent Provocateur (French term for) Provocating agent). A person sent, during political or social con-

flicts, into the adversary's rank to provoke, in the guise of an adherent, compromising actions. The method was much used in pre-revolutionary Russia when the Government sent agents provocateurs into the revolutionary movements to cause attempts or uprisings with a view to furnishing a pretext for the Government to suppress the movement.

Agre'ment or **Agre'ation.** Before a government officially announces the appointment of an ambassador, the approval of the government to whom the ambassador is to be sent, is taken. This is known as Agre'ment or Agre'ation.

Aide-memoire. A diplomatic note sent to a foreign state. It is generally a sort of reminder.

Allegiance. The duty of a subject for loyalty to his sovereign or state, in return for protection.

Ambassador, a diplomatic representative of a sovereign state sent in another state. As personal representatives of their sovereigns, ambassadors enjoy many privileges and powers which extend to their families and household.

Amgot : a contraction for Military Government of Occupied Territories.

Amnesty, a Greek term, meaning forgetfulness or oblivion is an act of the head of the State whereby he pardons political or other offenders.

Anarchism is from Greek *anarchia* (non-rule), a political doctrine standing for the abolition of every organised authority of State machinery and the creation of a stateless society instead. The anarchists hold that every form of government is equally evil and tantamounts to tyranny.

Annexation. From Latin *annexus* (tying up), the act whereby a State takes possession of a territory belonging to another State or to no State at all. It is onesided action without the consent or at least voluntary consent, of the lawful possessor.

Anti-Semitism is hostility towards the Jews. This movement was started in Europe during Hitler's regime in Germany. The Jews were declared a "foreign" race with 'poisoned blood', were deprived of all civic rights, exposed to umiliation, banned from all trades, prosecuted, sent to

concentration camps and their properties confiscated. They had always looked to Palestine as their country and ultimately realised their ambition by establishing the "State of Israel."

Aristocracy is derived from the Greek word *aristos* meaning the best. It is government by the men of best birth or condition. The ultimate power, in this form of government, rests in the hands of a small section of population. Usually, the controlling members of the government are taken from the noble and privileged class.

Aristocracy is based on the assumption that the few men who govern are the best and lays stress on quality rather than on numbers. According to Mill the governments which have shown "sustained, mental ability and vigour in the conduct of public affairs" have been generally aristocracies. It is another merit of aristocracy that it is a conservative form of government and tries to preserve the customary laws and distrusts innovations. "It curbs the passions of democracy, and at the same time checks the absolute tendencies of kingship." But it is not necessary that the few in power may possess good virtues. Birth in particular families, possession of wealth or of high military qualities guarantee that persons with those qualifications are good or efficient administrators. Aristocracies have often meant class-rule by the wealthy and have been very unsympathetic to the masses. The greatest weakness of this form of government lies in the fact that masses are excluded from all shares in public administration.

Armistice. A suspension of hostilities by an agreement between combatant parties.

Asylum. When a political refugee flees and takes protection in another country he is said to have taken "asylum."

Attache. A junior member of an ambassador's suite. They are of different types, *e.g.*, Naval, Military, Air, Commercial, etc., according to the work on which they are put.

Autarchy (autarky). Political self-rule or absolute sovereignty. Self-sufficiency in the economic sense, the idea that a country should produce at home everything she requires and cease to depend on imports.

Authoritarian Government denotes more or less a

dictatorial system of government, as opposed to the democratic system. The authority of the state is considered to be supreme and the subject has few or no rights at all.

Autocracy. A form of government in which political power is absolute and unlimited. Such governments do not exist today, but they were known to the ancient Greece.

Autonomy. A word of Greek origin meaning "self-law" or "home-rule". Provincial autonomy was established in erstwhile India under Government of India Act, 1935.

Back Bencher. The member of legislature occupying a back seat on account of his comparative juniority or the insignificant position of his party.

Balance of Power. The idea is that the strength of one group of powers should be equal to the strength of the other group, thus preventing any conflict and ensuring peace. It has played a very important part in the history of Europe.

Balfour Declaration. A letter written by T. A. Balfour, the British Foreign Secretary to the Chairman of the British Zionist Federation in 1917, under which the establishment of a Jewish national home in Palestine was promised. It read as follows: "His Majesty's Government views with concern the establishment in Palestine of a national home with Jewish people and will use their best endeavours to facilitate the achievement of this object."

Ballot is the system of secret voting.

Bicameral System (opposite of unicameral system). A system of government in which the legislature consists of two Houses: the lower and the upper. The House of Commons and the House of Lords in Britain or the House of Representatives and the Senate in the U.S.A. Both the Houses have specific defined powers and before a bill becomes a law, the concurrence of both is generally required. The Upper House usually exercises a restraint on the activities of the Lower House and prevents hasty legislation. While the Lower House is broadbased, is representative of younger elements and enjoys larger powers, and the Upper House comprises of old and experienced brains.

Bilateral Agreements are agreements between two parties

as opposed to multi-lateral agreements concluded among more than two parties.

Big Three stands for the U.S.A., Russia and Britain, who emerged as top Powers after the World War II.

Black Red. Officers of the Royal household and of the House of Lords in Britain.

Black Shirts meant Mussolini's Fascist Party of Italy.

Blitzkrieg (German "lighting war") the ideal being of rapidly destroying the opponent by one or several concentracted annihilating blows. Regarded as the strategic doctrine of Germany during Hitler's regime.

Blockade. The blocking up of a place by surrounding it with troops or ships. A blockade may be exercised against the enemy's coasts whenever it is intended to prevent the reaching of supplies to him.

Bolshevism is an alternate name for Communism. The Russian for "majority" is *bolishintov* and hence the radicals called *menshevski*, meaning "members of the majority." The moderate Socialists were called "mensheviki' derived from *menshnitov*, minority.

Blue Books. Proceedings and debates of the British Parliament are bound in blue and as such are called "Blue Books."

Such documents are called "Yellow Book in France and China. "White Books", in Germany and Portugal, "Green Books" in Italy, "Red Books" in Spain and "Grey Books" in Japan.

Blue Laws is the term used in U.S.A., in respect of laws which interfere with personal liberty.

Buffer State is used for a small neutral state between two greater states in order to prevent direct clashes between them.

Bureaucracy stands for government run by an elaborate system of administrative department controlled by high officials like the I.C.S. rule in erstwhile India. This system is often charged with red tape and is very rigid, conservative and full of routine.

By-Election. Election to a seat in legislature rendered vacant during a running term. The seat might become vacant due to death, resignation, or disqualification of a member originally elected.

Cabinet. The cabinet is an extra-legal body. That body of ministers who hold the most important portfolios constitute the cabinet. They are responsible to the legislature and have joint responsibility. Strict secrecy is the keynote of the meetings of a cabinet. Its meetings are presided over by the Prime Minister and it is the cabinet which decides the policy of the Government.

Candillo. "Chief of State," the official title of General Franco of Spain.

Caucus. A private meeting of influential political wire-pullers to decide upon candidates to be proposed for an ensuing election, or to fix the business to be laid before a general meeting of their party. This term is also applied loosely to any influential committee in a constituency.

Capitulation means the surrendering of troops of the enemy.

Cash and Carry. At the beginning of the last World War (1939), U.S.A. was neutral and was not selling arms and ammunition to the fighting nations. Late President Roosevelt, however, waived this condition so that Britain and France could buy arms in U.S.A. by cash payment and carry them across the Atlantic in their own ships. Provision to this effect was accordingly made in the Neutrality Act (1939).

Casting Vote means the vote cast by a chairman in the case of a tie, to decide an issue.

Centralism. The system of government under which the entire work of a state is controlled from the centre, the component units enjoying no appreciable powers.

Civil List means the statement presented to British Parliament annually showing the expenses of the King's household. In Pakistan, civil list refers to a publication wherein names of gazetted Government servants in civil employ are given.

Charge d'Affaires. Whenever the head of a diplomatic

mission is absent from his post, the conduct of the mission is entrusted to the most senior member of his staff, who is known as Charge d'Affaires.

Coalition. Sometimes two or more political parties combine to form a government. This is called a coalition government. This happens either at the time of a national emergency or when no single party returned to the legislature has a clear majority.

Collective Security stands for the theory that all nations should guarantee collectively the security of each individual nation.

Commintern. A central body of the Communists in Russia which controls and guides the Communist movements all over the world.

Common Law signifies that part of English Law which is not enacted by the legislature, but is based on judicial decisions. This is also referred to as "case-law", or "judge-made-law".

Communism. A revolutionary movement aiming at the overthrow of the capitalist system and establishment of proletaria dictatorship instead. (See 'Bolshevism' also). Lenin suggested calling the Bolshevik Party "Communist" so as to distinguish it from the moderate Socialist. Communist philosophy is materialistic and believes in violence. It strives to realise the noble ideal, a just society of equal men with common property, by the use of force. The Communist theory opposes moderate, democratic, socialism, describes it as treacherous and as an agency of capitalism, denounces as the concealed dictatorship of capitalists; rejects the idea of arriving at socialism through peaceful, democratic development, and maintains that it can be achieved only by armed revolution followed inevitably by periods of civil war and proletaria dictatorship. The Russian Revolution, the Soviet Union and the Red China are the Communist models.

Comp mise D'Arbitrage. When two powers agree to refer a dispute between them to arbitration and draw up an agreement defining the procedure to be followed, this agreement is called "Compromise D'Arbitrage".

Concentration Camp. Prison for political prisoners by dictators. The political prisoners are neither tried nor given a chance of self-defence before any court. They remain there for indefinite periods.

Concordat. Formal compact between Church and State, usually for the regulation of ecclesiastical affairs.

Condominium. Common rule of two or more nations in territory. Anglo-Egyptian rule in Sudan is an example.

Confederation. (*con*, together; *facere* to make) a league, an alliance of states for defined common purposes. Confederation is union of a number of fully sovereign states for the maintenance of their external and internal independence. "The union has organs of its own and a certain power over the member states, but not over the citizens of these states, *i.e.*, it is merely a working arrangement, and from the point of view of international relations, the states remain separate." Today, there are federations, but, strictly speaking, no confederations.

Both a federation and a confederation have a central government charged with administration of certain specific objects like defence. There are fundamental differences between a federation and a confederation. In a confederation each state retains its sovereignty, each unit remains an international person and can enter into treaty relations with foreign states, but in a federation this is not the case. It is the federal government which is sovereign. Confederation agreement is a sort of international agreement, and any party may secede from it at any time but in a federation the units have no such right. Confederations deal only with constituent states and not with individual citizens, but a federal government deals directly with subjects or citizens and not through the governments of its units.

Conscientious Objector is a person who refuses to join the fighting forces on moral or religious grounds.

Conscription is compulsory enlistment of all able-bodied, men between specified age limits for military service. Such a measure has to be adopted by a nation during grave emergency.

Constituency. Body of persons forming an electorial district entitled to elect representatives to legislature.

Constituent Assembly. A representative body of people assembled together with the specific objects of formulating the constitution of the country.

Constitution means the fundamental laws of a state (drawn up by its Constituent Assembly) laying down the system of government and defining the relations of the legislature, executive and judiciary to each other and to the state.

Consul. An official employed by a state to protect the interest of its citizens and to assist its trade in another state.

Convention denotes a formal meeting, or formal agreement after a conference. Convention Parliaments are those summoned without the king's writ. Agreements between states on matters of non-political interests are usually called convention. It also means a "temporary treaty".

Corridor, Polish. A narrow strip of land created in 1919 giving Poland an outland to the Baltic Sea. Germany occupied the Corridor in 1939.

Coup d'etat. A sudden stroke of policy, through which the government is changed by force by holders of governmental or military force. It differs from a revolution inasmuch as while it is made "from above," a revolution is "made from below". A revolution is carried out by large masses of people, while a coup d'etat is carried out by the state officials, generally by the army.

Credentials. A letter issued by a state in favour of its representative in another state entitling him to the credit of confidence. Credentials are presented by newly appointed ambassadors to the heads of the states to which they are sent.

Danzig. A Baltic port with 97 per cent. German population before the World War II. This is the only outlet to sea for Poland and has always been a vital point in Polish history. It was a free port under the protection of League of Nations until 1939, when it was annexed by Hitler. It was made a part of Poland in 1945.

Dauphin. The title of the French heir-apparent during the days of monarchy.

De Facto Recognition is an act whereby a new government or state without formal recognition is made a partner in international relations of any kind.

De Jure Recognition means the formal recognition of a new government or state.

Democracy from Greek *demos* (people) and *krotein* (to rule) meaning government by the people. Democracy has been described as "government of the people, by the people and for the people. Democracy is of two kinds—direct and representative. In the first case the people as a whole take a direct part in the work of governing themselves, making their own laws, while in the second case, they choose representatives to do governing for them. Democracy is also termed the rule of the majority, because the legislation is actually decided on by "majority of the majority" who may be and often are but a minority of the whole. Democracy is a government in which everyone has a share. As a matter of fact every country tries to proclaim that its own brand of democracy is the best. Soviet Russia claims that ideological democracy is found there. Western Powers claim that democracy, the whole of it, is found in their constitutions, although they are poles apart.

In democracy, individual liberty has a better chance. Government is not regarded as the exclusive privilege of a special class of men. A larger number of people can take part in the conduct of public affairs than is possible in any other form of government. Democratic government can enlist a large amount and variety of personal energies for public welfare. People develop a sense of responsibility and public spirit and get interested in their country. Consequently, a democratic government is less liable to be overthrown by revolutions.

Unless the mass of citizens are acquainted with their rights and duties, and possess a high sense of civic life, they cannot run a democratic government successfully. But actually majority of the people do not possess the capacity to understand the interests of the community. It is thus regarded as the government by the most ignorant and the most incapable. The masses are likely to be swayed by unscrupulous leaders. All the same, democracy is considered superior to other forms

of government. With all its defects it guarantees a better lot to the masses.

Democratic Party is one of the two parties in the U.S.A. (the other being the Republican).

Despotism. An arbitrary government by one invested with full powers.

De'tente means "relaxation of tension."

Diarchy. A form of government in which the ultimate power is vested in two persons or two bodies. It is a dual government and is very unpopular. By the Government of India Act, 1919, a system of diarchy was introduced in the provinces.

Dictatorship signifies absolute rule of one person or a group, without any consent of the governed. This dates back from the old Roman Republic, wherein a man could be appointed dictator when the state was in emergency. Modern dictatorship is personal or that of a group or class (army proletariat), but even in the latter case it is usually embodied in the person of a leader.

Dictatorship has certain merits. A good dictator can promptly take energetic measures to deal with emergencies; he can be ruthless where ruthlessness is essential, he passes good laws, repeals bad ones, chooses the best administrators. He is in a better position to handle critical situations, so much so that a determined dictator can achieve marvellous success both in internal administration and foreign policy. It is very often that dictatorships begin in an atmosphere of national revival. There are certain fundamental defects in dictatorship. They usually degenerate into reign of crude repression and terror. A dictator, as he is not sure of his power, is tempted to adopt violent measures against his opponents and is ultimately led to suppress general freedom of the citizens. It is very difficult to find equally good successor of a good sincere dictator and a regime established by a dictator is liable to collapse on his death.

Diehards. Inflexible members of a political party. The Conservatives in Britain were nicknamed as Diehards because of their ideas regarding colonial expansion and disallowing them freedom, and free competition in trade and industry.

Diplomacy is "art and practice of conducting negotiations between nations, as in arranging treaties, artful management in securing advantages without arousing hostility, address or tact."

Diplomatic Illness. Whenever an ambassador or a diplomatic representative does not for certain reasons want to attend a function or meeting, he pleads illness in order not to cause an undue offence. Such feigned illness is called "Diplomatic illness."

Disenfranchisement means depriving of the right to vote.

Dominion Status. Dominions were described as "autonomous communities within the British Empire, equal in status, in no way subordinate one to another in any respect of their domestic external affairs, though united by common allegiance to the Crown, and fully associated as members of the British Commonwealth of Nations," in the Balfour Declaration. At present there are the Dominions of Australia, New Zealand, South Africa, Eire, Canada, Pakistan and Ceylon. Bharat has, however, become a Republic with no allegiance to the Queen of England.

Dossier. A confidential state document containing particulars of a person.

Downing Street. The seat of the British Government. Contains the residence of the Prime Minister (No. 10) of the Chancellor of the Exchequer (No. 11) and the Foreign Office.

Duce. Italian for "leader". The title was assumed by Mussolini.

Embargo. A ban on the export of certain goods or on the granting of loans to foreign countries..

Embassy. The charge or function of an ambassador, the persons sent on an undertaking.

En Clair. A telegram in plain words and not in secret code is known as 'En Clair' telegram.

Encyclical. A circular letter by the Pope on religious and political questions, issued only on important occasions and defining papal policies over a length of time. They are significant documents.

Entente Cordiale. French "cordial understanding." the understanding reached in 1904 between Great Britain and France, which has continued ever since. Entente means diplomatic friendly understanding between states or a group of states adhering to the understanding in diplomatic affairs.

Envoy. A representative of one country sent to a foreign country to transact business, usually a diplomat of the second order.

Evacuee. One who is conveyed to a safer place in a war.

Escheat. Property which falls to the state for want of an heir, or by forfeiture.

Espionage. An organised system of spying.

Ethnographical Principle. The principle that all persons of the same race or language should be united in a common state, and political boundaries should also be on the same basis.

Extradition means the delivering up, by one Government to another, of fugitives from justice. It is usually the result of a treaty and if there is no extradition treaty, the fugitives are safe.

Extra-territorality. A term of international law, denoting the immunity of certain persons, property or places, from the laws, which prevail in the state to which they belong. This is usually enjoyed by sovereigns and diplomats in foreign countries.

Fascism. Italian nationalist movement founded by Mussolini in 1919. The party stood for nationalism, to reduce the nation to discipline, order and soldiery.

Fatalism. Doctrine that all things are preordained by an inexorable necessity.

Federation is a system of government in which a number of independent states unite together and form a central government for certain common affairs, while for others they are independent of one another. A federation may also be formed by liquidating a unitary state into largely autonomous units with a common central government to administer subjects of common concern. There is a division of power between the

Federal (Central) Government and the governments of the states each surrendering a part of its sovereignty to be exercised by the Federal Government. In some constitutions, states retain all right not expressly handed over to the Federal Government, while in the other, the states have only those powers specified as are belonging to them. The first type of federation exists in the U.S.A., while the second type is in Canada. It follows, therefore, that while in U.S.A. the major portion of sovereignty lies with the states, in Canada it is the Federal Government that is the predominant partner. Please see also "Confederation."

Fifth Column is a term originating from the Spanish Civil War (1936-39) when General Franco attacked the Republicans in four columns from the outside and his adherents organised uprising, espionage and sabotage within the Republican ranks. The secret fighters behind the opponents' lines were called "fifth column." This term has now come to signify a traitor who works against the interest of the state and helps the enemy.

Filibustering (U.S.A.) means the holding of the bills from passing in the Senate by organising a continuous succession of long speeches by the opposition party.

Fin De Non Recevoir. The diplomatic practice of rejecting an official complaint without looking into its merits.

Forms of Government. The most outstanding forms of governments are (*i*) Monarchy, (*ii*) Aristocracy, (*iii*) Democracy and (*iv*) Unitary. For details please refer to relevant pages of this part of the book.

Four Freedoms. These were enumerated by the late President Roosevelt as follows:—(1) Freedom of Speech, (2) Freedom of Religion, (3) Freedom from Want, and (4) Freedom from Fear.

Fourth Estate. The Lords Spiritual, the Lords Temporal and the Commons are known as the three estates in England; while the press on account of its great influence on the masses and the policy of State is called the "Fourth Estate".

Franchise means the rights to vote for election of a member to a legislature. This is also called "Suffrage."

Free Port. A port of one state to which another state has been granted free access, with loading and unloading of goods and conveying them to or from the harbour without custom duty.

Freedom of the Air signifies freedom of passage by air; freedom of facilities, use of air-ports and weather reports and freedom of trade.

Freedom of the Sea. Freedom for commercial ships to sail in times of peace and war wherever they will, without hindrance, on the high seas outside territorial water.

Fundamental Rights. The basic rights which are usually incorporated in the constitution of a country to be enjoyed by all nationals of a state irrespective of caste and creed. They generally comprise right of life and liberty, right of property, right of contact, right of free speech, discussion and public meeting; right of worship and conscience, right of association and right of family life.

Fuehrer is German word for "leader." The title was assumed by Hitler.

Geneva Convention (1864). A convention was signed by all the leading European Powers in 1864 at Geneva by which the neutrality of ambulances, hospitals, sanitary officers, chaplains and others engaged in the service of the sick and wounded, was guaranteed. The persons thus employed were required to wear a Geneva Cross (Red Cross) against a white background as a sign of office.

Gentleman's Agreement. An informal agreement between two or more states, based on verbal assurances or the exchange of mere letters and without any formal treaty.

Gestapo. The German Secret Political Force organised during Hitler's regime to deal with the opponents of Nazism. It soon became a terror of the German population.

Good Offices. Whenever a Power offers its services to two or more countries to settle down a controversy between them or avoiding war by peaceful negotiations, it is said to have offered its "good offices".

Government means that part of the organisation of a state which deals with its day-to-day administration. Its

three main organs are executive, legislature and judiciary. "Governments may come and go but a state remains for ever" signifies that the government of a country may change from time to time, but a state continues unless it is attacked by another state and absorbed by it as a part of her own territory.

Government, Forms of. Vide "Forms of Government."

G.P.U. The Soviet Russian Political Police organised after Communist Revolution of 1917 to trace out and annihilate the opponents of Communism.

Hansard. The name given to the official publication of the proceedings of the British Parliament.

Hara Kiri. Form of suicide committed by military classes of Japan.

House of Commons is the name of the Lower House of the British Parliament. It is virtually the ruling House since the Lords' Veto was considerably modified in 1911. The House of Commons has 615 members elected by adult male and female suffrage. The House is elected for a maximum period of five years but earlier dissolution is possible, and during an emergency (such as war) the life of the House may be prolonged. The Chairman of the House of Commons is called Speaker.

House of Lords is the Upper House of the British Parliament composed of the Lords Spiritual and the Lords Temporal. The Archbishops and 24 English Bishops constitute the Lords Spiritual, while the Lords Temporal consist of the Royal Dukes and all Lords ranging from Marquis to Barons. The seats are hereditary in the United Kingdom peerage. House of Lords cannot pass any bill with amendments unless these are approved by the Commons. The President of the House of Lords is called the Lord Chancellor. He is a member of the Government. The House of Lords also sits as the highest Court of Law in the country.

Impeachment means the special trial of the head of a state or a minister before Parliament or other high tribunal appointed for the purpose, for offences against the state.

Imperial Preference is the system under which the states

within the British Empire exempt goods from Empire States from import duties or charge lower duties. This was the result of Ottawa Agreement.

Imperialism. In a broader sense, "imperialism" means a general tendency to build up great empires through conquest but in a narrow sense, relating only to the British Empire. It is a tendency towards strengthening the connection between the various parts of the British Commonwealth and towards thinking politically in terms of Empire as a whole.

Internationals. The international associations of socialist parties are set up for the purpose of co-ordinating their policies. There are four Internationals founded from time to time during 1864 to 1936. The last one was the association of small radical groups under Trotsky, formed in 1936.

International Law is the body of law or set of rules which civilized states regard as binding on them in respect of their relation with each other. They comprise of numerous treaties, pacts, conventions and international practices. U.N.O. is codifying international law.

Iron Guard stood for Rumanian Nazi Organisation.

Isolationism. A body of political opinion in the U.S.A. advocating non-interference in European affairs. There was a certain amount of isolation in Great Britain before the World War II, advocating non-interference in Continental or at least East Continental affairs.

I.W.W. Initials of Industrial Workers of the World, a radical movement in American Labour. It stands for "Industrial" Unionism and organising workers of each industry in one unit.

Joint Responsibility. In a cabinet system of government although every minister is in charge of a particular portfolio, all ministers are jointly responsible to the Legislature and a vote of no-confidence against any one is a censure on all. Thus, the responsibility of the cabinet as a whole to the legislature is called Joint Responsibility.

Junta. A self-constituted committee which meets for political purposes.

Kremlin. A castle in Moscow, formerly residence of the Tsars, the seat of Soviet Government. Whenever a reference is made to "the Kremlin" it means the Soviet Russia, *e.g.*, "The Big Three have protested to the Kremlin against the establishment of armed forces in Eastern Zone of Germany under the guise of the East German Police Force."

League of Nations was established in 1930 under a Covenant of 26 Articles forming a part of the Treaty of Versailles. The seat of the League was Geneva. The main purpose of the League was preservation of a world peace and security and settlement of international disputes either by arbitration or conciliation. There were various organs through which the League worked.

The League, however, failed to achieve its object because of the rivalries of its members, the defective procedure of securing unanimity on all important matters, the inherent looseness of its organisation and above all, lack of an executive force of its own.

Left. A political term applied to politicians or parties who hold views different from existing ones. "Right" is its opposite which includes politicians or parties holding conservative or existing views.

Lebensraum. German word for "living space," a new slogan raised by the Germans in the World War II. It denoted two different things:—

(*i*) The alleged over-population of Germany and hence the necessity of acquiring more territory.

(*ii*) The German claims for control of certain neighbouring zones, particularly in East and South-East Europe.

Lend and Lease. The policy adopted by the U.S.A. during and after the World War II, under which it undertook to provide Britain and afterward China, Russia and Turkey and certain other Allied states with ammunition and other necessities as a loan to be liquidated on some future undefined date by payment or repayment in kind or property. About 45 thousand million dollars is worth of goods, etc., were provided to different countries by U.S.A. under the arrangement, which

ultimately took the shape of a mutual programme ignoring the balance of account. This policy came to an end in August, 1945.

Liberal Party. Successors to the Whig Party of the 18th and 19th centuries. The party is progressive, places the liberal democratic principles in the foreground, opposes Communism, stands for the trade and is moderately left wing.

"Living Space." See Lebensraum.

Lobbying (used originally in U.S.A.) means pursuing a political aim by attempting to influence the votes of representatives by means of personal contacts, usually in the "lobbies" or part of a legislative building to which the public has an access.

Luftwaffe. Name given to the Nazi Air Force.

Maginot Line was the French system of fortifications along the whole eastern frontier of France. Built in 1927-35 under the directions of Maginot, the then War Minister and constantly strengthened and modernised thereafter till the World War I when it fell to the attack of Nazis.

Mandate. A system of colonial administration adopted after the World War I for the former German colonies and certain Turkish territories. The rights to the territories in question were transferred to the League of Nations, which entrusted their administration to certain Allied powers. A mandate provided only for temporary aid by the Mandatory power for the mandated territory until the latter was able to govern itself.

Maroons. The runaway slaves of Jamaica and Cuba.

Marxism, the socialist doctrine following the theories of Karl Marx. Marxism is based on the method of dialetic materialism. It looks upon economic conditions as the basis of life, political and ideological system being merely the "super-structure" above them and undergoing changes along with them.

Micado. Official title of the Emperor of Japan.

Modus Vivendi. Latin "way of living" an informal agreement between the Pope and a government for the

regulation of ecclesiastical affairs of Roman Catholics in a country. The term is also used for other provisional and informal agreements in political life.

Monarchy is a form of government in which supreme power is vested in the hands of one person, the monarch. A monarchy is 'limited' or constitutional when monarch's powers are restricted, and it is absolute when his powers are not limited by a constitution. The chief merits of absolute monarchy are that a monarch can act quickly with unity of counsel, continuity and consistency of policy. He commands the best service in the country and can provide a most efficient administration. A just and efficient monarch secures the unification and consolidation of a nation. There are also serious defects in this form of government especially when it happens to be hereditary, because all monarchs cannot be expected to be capable and wise men. History affords so many examples of corrupt, inefficient and feeble-minded rulers.

Money Bills. All bills involving financial commitments on the part of a government are called Money Bills. Whether or not a particular bill is a money bill is decided by the Speaker of the House of Commons and his verdict is final. Such bills must originate in the House of Commons in the British Parliament and the Lords have no right to withhold them for more than a month.

Monroe Doctrine. A principle of American policy declining any European intervention in political affairs of the American continent. President Monroe declared in a message on December 2, 1823 that "the American continent by the free and independent condition which they have assumed and maintained, are henceforth not to be considered as subjects of future colonisation by any European Powers. The political system of the Allied Powers is essentially different from that of America....We should consider any attempt on their part to extend their system to any part of this hemisphere as dangerous to our peace and security." Americans have worked on this doctrine in connection with many problems concerning their country and have disliked foreign intervention in their home affairs. The doctrine is less popular in the Latin-American States which suspect it of being an instrument

of U.S. hegemony and economic penetration. Anyway, the Monroe Doctrine is not an international law, but a national policy of the U.S.

Most-favoured Nation Clause. A frequent clause in trade treaties whereby each signatory undertakes to extend to the other signatory automatically any tariff reduction or other favour granted to any third country in future. The idea is to exclude preference for any particular country. British Imperial Preference is exempted from the Most-favoured Nation Clause.

Munich Agreement. The agreement between Germany, Britain, France and Italy was signed at Munich on September 28, 1938. It provided for the cession to Germany of the Sudetan-German districts of Czechoslovakia. The agreement was described as surrender. Anyway, it was the last stage of appeasement policy and was broken by Hitler through his seizure of what was left of Czechoslovakia in March 1939, and this was the turning point in British and French policy towards Germany—resistance to aggression taking place of the appeasement.

Nation, Nationality. The difference between the two terms is very acute and must be understood clearly and one should not be mistaken for the other. Nation is concrete, but Nationality is abstract. Nation is primarily political in character while Nationality is spiritual.

Nation is concrete because it consists of so many persons. Nationality is abstract because it is just a sentiment and is concerned with the spirit of a man. It is, after all, the feeling of the oneness which is born as a result of common grievances and common hardships undergone by a group of persons.

Nation implies sovereignty of state. A Nation must be independent and live in a sovereign state. Some people may be a Nationality at one time and a Nation at another. A very good example is found in the Poles who were a Nation up to 1792 living in an independent state. They became a Nationality in that year when their state was divided among Austria, Prussia and Russia. They again became a Nation in 1919, when as a result of Treaty of Versailles they became

independent. In September, 1939, when Poland was attacked by Germany and conquered by her, the Poles again became a Nationality and did not remain a Nation. They may again become a Nation when they attain statehood.

National Socialism. German Nationalism movement led by Adolf Hitler. The beginning of the movement dates back to 1912. Hitler's party was, however, founded in 1919 by a German worker named Drexler.

Nation of Shopkeepers. A phrase said to have been used by Napoleon for the British nation in derision.

National Debt. A debt incurred by the government of a country for financing a war to implement a scheme of national reconstruction.

Naturalization. The word refers to the admission of a foreign national to the citizenship of a country he wants to adopt.

Nazi—New Order. Contraction for the German National Socialists. The German pronunciation is 'Naatsy' "Nazism" is the corresponding contraction for National-Socialism. Hitler's scheme for the permanent exploitation of that part of Europe which had been overrun by his armies, was known as "New Order."

Nep. New Economic policy adopted by Russia in 1922 with a view to promoting the recovery of production and trade. The Nep was liquidated in 1927 and succeeded by the Socialist Five-Year Plan policy.

Neutrally. Non-participation of a country in a war between other countries. According to International Law, a neutral country must abstain from any interference with the war. She must neither favour nor hinder against any violation of her neutrality.

New Deal. The policy inaugurated by President Roosevelt in the U.S.A. in 1933 in order to overcome the great economic crisis which had broken out at the end of 1929. This policy consisted of a series of far-reaching economic and social measures which were opposed to many American traditions. It started from a programme of industrial recovery through public works, an ample supply of cheap credit and the increase in buying power.

Non-Aggression Pact. An agreement between two or more countries to abstain from the use of force against each other and to settle their differences or disputes by negotiation or arbitration.

Non-Intervention. (Non-interference). A fictitious policy of the Powers in the Spanish Civil War 1936—39) when they and a number of smaller countries agreed not to supply arms or send troops to either of the Spanish parties.

Nordic. A term describing the Scandinavian States—Sweden, Norway, Denmark, Iceland—and their inhabitants. This also refers to the racial theory. The Nordic race is described as tall, blue-eyed and long-haired and generally stated to have come from Scandinavia.

O.G.P.U. Alternative for G.P.U.—the Soviet Secret Police.

Oligarchy. According to Aristotle, oligarchy is the perverted form of aristocracy, which is the rule of a few. Whenever these few start ruling in their own interest at the cost of the general public, whose welfare should be their first concern, such rule degenerates into oligarchy. This is considered to be a bad form of government.

Open Door Policy. The policy of keeping the doors open to all countries coming for trade on equal terms without any monopolies for any individual country.

Ordinance. Decree or order that is not, strictly speaking, a law and is not passed by the legislature. An ordinance is usually issued by the Governor of a province or the Governor-General and although it is not fully a law, it has the power of law.

Pacifism. The movement for the abolition of war. Pacifism is particularly strong in England and America where even conscientious objects to military service are legally recognised. Dictatorial countries have, however, been condemning and persecuting pacifism.

Pan-American Conference. The annual conference of the 21 American Republics forming the Pan-American Union with headquarters at Washington. This Union fosters political and economic collaboration among American

Republics and the feeling of solidarity between North and South America.

Pan-Arabic Movement. The movement striving for an Arab state of federation. This movement is founded more on national feeling rather than religious. All Arabic-speaking countries are in favour of it.

Pan-Islamism. A movement striving for close political co-operation among Islamic peoples and, in the end, for an all-Islamic Empire or Federation. This is based on the principle of Islamic Empire Brotherhood (*al-Akhuwat*).

Pan-Slavism is the idea of a common policy or even union of all Slav peoples—comprising of East and South-East Europeans, Russians, Ukrainians, White Russians, the Poles, Czechs, the Slovaks, the Yugoslavs, the Bulgarians, etc.

Parliament is the name given to the British Legislature comprising of the House of Commons and the House of Lords. Although the term is "British" in origin, many other countries of the world also call their legislatures "Parliament".

Parliament Act of 1911. This Act is rightly considered as epoch-making in the history of the House of Commons of the British Parliament. The powers of the House of Lords were considerably curtailed by this Act and the House of Commons became legally sovereign. The Act provided that (*i*) all money bills passed by the Commons would become law one month after their having been passed, whether or not the Lords gave their assent to it; (*ii*) Speaker's ruling regarding the nature of the bill would be final; (*iii*) all other bills passed by the Commons would become a law after two years, provided it is passed by the Commons three times during this period and (*iv*) the life of the Parliament was reduced from seven to five years.

Pipe-Line. A person who leaks out secrets of political nature without wishing to be quoted as the source.

Plebiscite. A vote of the electorate taken to decide a specific issue.

Point of order. Any point of discussion that raises a legal or constitutional issue.

Politbureau. Contraction for the Political Bureau of the Communist Party in Soviet Russia, regarded as the most powerful body in the country

Plenipotentiary. A special ambassador or envoy to some foreign court is called plenipotentiary.

Plural Voting. By means of plural voting certain individuals receive more than one vote. Thus a person with sufficient property in more than one electoral area—if property is a qualification—may vote in each area for which he is qualified. Graduates with 10 years' standing, are also entitled to two votes, one for representative of the constituency where they live and the other for the representative from the University constituency.

Poll. Term denoting the taking of votes at an election.

Popular Front. A suggestion for political collaboration of Communists, Socialists and other democratic parties against Fascism, put forward by the Communist International in 1915.

Privy Council. -It is a Council of British King or Queen's Advisers comprising of selected princes of royal blood, archbishops and statesmen of old standing and experience from United Kingdom and Commonwealth countries. But the Council seldom meets as a whole. Its advisory functions are performed by the British Cabinet whose members are ex-officio members of the Privy Council.

Privy Purse. Allowance from public revenue for a monarch's private expenditure.

Preamble. Preface or introduction, especially of an Act of Parliament, giving its reasons and purposes.

Proletariat. Greek *proles* (prolific)—alluding to the number of children of the poor classes, the class of wage-earners. Generally speaking, proletarian class refers only to manual workers but the process of "proletarianisation" of the middle class is also spoken of.

Proportional Representation is an electoral system under which minority votes are not lost. This system of voting prevails in Switzerland.

Protectorate. The relationship of a sovereign state to

a territory not recognised as sovereign, over which the former exercises a direct or indirect control, especially for external affairs. Uganda and Zanzibar are British Protectorates.

Protocol. The original copy of a formal diplomatic document, especially of treaties before they are signed by the parties concerned. This also refers to diplomatic etiquette.

Prorogation. To bring the meeting of Parliament to an end for some time, so that when the House reassembles, the proceedings start from the point where they were left.

Provincial Autonomy. This was a special feature of the Government of India Act, 1935, under which the provinces were given complete autonomy in so far as the provincial subjects were concerned, to be controlled by a legislature elected by the provincial voters.

Purge. Literally, to make pure. In politics, it means the expulsion of the unreliable, unruly or disobedient members of a party from its membership.

Putsch. German word meaning "attempt to take by force," specially power or control of state.

Quisling. A traitor acting against his country in collaboration with an enemy. The word is derived from the name of pro-Nazi politician, Vidkum Quisling of Norway, who collaborated with Hitler and became a puppet Premier in 1942. He was shot as a traitor in 1945.

Quorum. The minimum number of the members of any association eligible to transact business.

Ratification. The authority exercised by the legislature of a country against the possible misuse of executive authority by the head of a state. In the U.S.A. this power is vested in the Senate which ratifies all diplomatic appointments made by the President of the U.S.A.

Recall. Calling back by the electors of a representative who does not put their views before the legislature, by passing a vote of no-confidence against him and compelling him to resign his seat.

Reconnaissance. The act of surveying a tract of country with a view to military or engineering operation.

Red Army. The army of the U.S.S.R. is called the Red Army. It rose as the army of Communist Revolution in 1917 and was called "Red" as it bore the red flag of the revolution.

Red Cross Society. An international agency for the alleviation of human suffering, especially for giving relief to the sick and the wounded in time of war. The symbol of the society is the familiar red cross on a white background.

Referendum. Literally, the word means "must be referred". The referendum is a popular vote of the electors on laws or legislative questions which have already been discussed by the representative body of the nation, but are referred to the vote of the electors for their verdict. Switzerland is the home of the Referendum, where it is compulsory for a constitutional amendment, and optional at the request of 30,000 citizens or the legislatures of eight cantons for ordinary laws.

Regent. One who rules on behalf of a sovereign. When a sovereign is minor, or is insane, or in any other way incapable of ruling, it is usual to appoint a regent to act for him.

Reichstag is the name of the German Parliament.

Reparations. Fine paid by a defeated nation to the victorious nation for the losses borne by the latter on account of war. This refers particularly to the war indemnities to be paid by Germany under the Treaty of Versailles, which were fixed at 132,000,000,000 marks in gold in the first instance.

Republic. A Republican Government is one in which the head of the executive is elected by the people of the state and there is no hereditary sovereign. The Governments of the U.S.A., Turkey, France are of the Republic type.

Republican Party. One of the two great parties in the U.S.A.,—the other being Democratic.

Rescript. The official answer of an emperor to any legal question. A royal decree.

Residuary Powers. There are two types of powers in the federal system of Government—those entrusted to the Centre (Federal), and those exercised by the Unit Members of the Federation. In the U.S.A. the powers of the Centre have been defined while the Residuary Powers lie with the member-states;

while in Canada, the Powers of the Units have been specified and all the residuary powers are left with Federal Government. Thus, while in the U.S.A., the member-states enjoy more powers, in Canada the Federal Government is the predominant partner.

Rule of Law. It implies "equality before law". The supremacy of law over arbitrary law.

Raison d'Etat means that the state interests are supreme over private morality.

S.A. German Storm Troops—the Nazi Party army.

Sabotage. To destroy the state property or to undermine its interests by adopting terrorist or underground methods.

Safeguard. In the politics, it means provision in the constitution of a country to protect the interests of a minority or backward community.

Sanctions. Measures intended to enforce the fulfilment of international treaty obligations. Sanctions were embodied in the Covenant of the League of Nations and Article 16 thereof provided for economic and military sanctions against countries proceeding to war in defiance of Covenant provisions.

Scorched Earth Policy. A policy adopted by the defeated country, under which everything that can be of some use to the enemy is destroyed so that it cannot be of any help to him.

Security Council. The Security Council, one of the six principal organs of the United Nations, is entrusted by all members of the United Nations with the primary responsibility for maintaining peace and security. This highly important body of eleven States consists of five permanent members and six elected members. China, France, U.S.S.R., United Kingdom and the United States of America are permanent members.

The Security Council determines the existence of any threat to the peace, or the breach of the peace, or act of aggression, and decides what measures are necessary to maintain or restore international peace and security. These may be calling on members to apply economic sanctions.

The Council reports to the General Assembly either by annual or special reports. It has a subsidiary body—*Military Staff Committee.*

The duties of the Military Staff Committee, according to the Charter, are to advise and assist the Security Council on all questions relating to the Security Council's military requirements for the maintenance of international peace and security, the employment and command of forces placed at its disposal, the regulation of armament, and possible disarmament.

The world having been divided into two hostile camps—the Communist and the non-Communist—the U.N.O. is losing its effectiveness. The Security Council, as it appears from its conduct, becomes active only when the vital interests of certain powerful nations are concerned. And if the present state of affairs continues the Security Council and consequently the U.N.O. may become totally ineffective as it happened in the case of the League of Nations.

Select Committee. In modern legislatures, Committees are appointed to examine, more closely than the full legislature can do, measures proposed in the House. A committee of selected members of the Legislative Assembly, formed to consider a measure thoroughly and report to the Assembly, is called a Select Committee. Sometimes such committees are temporary, appointed for a special purpose and cease as soon as the purpose is served. There are also standing and permanent committees.

Seigfried Line. The German line of fortifications along the western frontier. It was the German counterpart of the French Line Maginot. Unlike Maginot Line, the Seigfried Line was hurriedly constructed within three months in 1938.

Sit-down Strike. A type of strike in which the strikers do not leave the premises of the factory, sit at the plant but stop work. It was first resorted to by Polish coal miners in 1934 who refused to leave the mines until their demands were fulfilled.

Slavs. A group of people in East and S.-E. Europe comprising the Russians, the Ukranians, the White Russians,

the Poles, the Czechs, the Slovaks, Yugoslavs, etc. All Slav languages are closely related to each other.

Slovaks. A Slav people in the Northern Carbathians neighbouring with and closely related to the Czechs.

Slovens. A South Slav people inhabiting the former Austrian province of Krain and the southern part of Serbia in the South-Eastern Alps, now belonging to Yugoslavia.

Socialism. A system of common property and planned economy, and the political movement aiming at it. Modern socialism began with the Utopians in the first half of the 16th century, describing ideal human society in books. The Soviet Union is a State with all-round socialist system. Mexico has also taken socialist measures. Other countries have not adopted socialist policies so far, but State control and State initiative in economics have become more and more outspoken throughout the world.

Solid South. An American political term referring to the fact that the Southern States have for a very long time voted invariably for the Democratic Party.

S.S. Initials of German Schutz-Staffel, protective squadron, a branch of Nazi Party army recruited from particularly reliable Nazis, preferably those coming from better classes.

Sovereignty. Sovereignty means the "supremacy". In Political Science, the term "sovereign" is applied to whatever authority is absolutely supreme in the State, so that from it there can be no appeal to any higher authority and there is no power in the State to override its decisions. In British Constitution, sovereignty resides in "the King-in-Parliament," *i.e.*, the King, the House of Lords and the House of Commons. In the words of de Loline, "Parliament can do everything but cannot make a woman a man, and a man a woman."

Speaker. The Speaker is the name given to the President of the House of Commons, who is elected by the House for the duration of Parliament. He is not a party official. The man chosen is usually a member of experience who commands the greatest respect in the House irrespective of his party ties. He presides over the House, and, as president, interprets the

rules of the House, guides debates, announces the result of voting, decides on points of order, and advises the Houses, or members, on matters not covered by law or precedent.

Standing Committee is a permanent committee comprising of the experienced and selected members of a legislature, attached to a ministry in order to advise the latter in all important measures.

State and People. There are various definitions of State. Dr. Woodrow Wilson has defined a State in a few words by saying that a State "is a people organised for law within a definite territory."

State is a legal or political concept and consists of territory, population and sovereignty. But in so far as the "people" are concerned, fixed territory and sovereignty may not be present. A "people" may be divided into two or more States. It is properly a rational and ethical concept.

Mere combination of men does not form a "people". A group of persons must live together for centuries, develop a common civilisation and culture in order to become a "people".

Status Quo (Latin). Usually used in politics, signifying that there is no change in the position and it is as before.

Statute. Law made by the legislature of a country, which is binding on all subjects of the State. After a law is enacted, this is placed on the statute book.

Sublime Port, The. This was the name given to the Court of the Sultan of Turkey before 1922 when the Turkish Republic was established.

Suffrage is the right to vote for members to the legislature of a country. Universal suffrage—men and women having right to vote on equal basis—was introduced in England in 1928 by the Representation of the People's Act.

Supplementary Question is the question that arises while another question is under discussion in a legislature and is asked without any previous notice.

Syndicalism. This term was used early in the 20th century for the development of the Labour Movement. It aimed at the elimination of the capitalist and the control of industry by syndicates or workers. It originated in France.

Territorial Waters is that part of a sea or ocean adjoining a country, over which that country has its jurisdiction. According to convention, territorial waters extend up to three miles from the coast-line measured from low-water mark.

Totalitarian. A term used to denote the single party, or one-man, dictatorial system of government, based on the "totality of the state."

Trade Unions. Associations of workers and other employees for common representation of their interests towards the employers. Trade Unions strive to secure better wages, good working conditions, shorter working hours and other advantages for their members.

T.U.C. means Trade Union Congress (see 'Trade Union').

Tyranny. Rule of absolute monarch administered cruelly.

Ukase. Official decree or order.

Ultimatum. Final demand of any type. It is usually used for the final demand preceding a declaration of war.

United Nations Organisation (U.N.O.). The United Nations—was based on the co-operation that victory in peace depends on co-operation, the pooling of ideas, brains and resources. With these ideas in their minds, the delegates of 50 nations resolved in June, 1945, "to unite their strength" to create new organisation. On that day, at San Francisco, they signed the Charter which governs the United Nations.

The preamble to the Charter of the United Nations reads as follows:—

We the People of the United Nations are determined to save succeeding generations from the scourge of war, which twice in our life-time has brought untold sorrow to mankind, and to reaffirm faith in fundamental human rights, in the dignity and worth of human persons, in the equal rights of men and women and of nations, large and small, and to establish conditions under which justice and respect for the obligations arising from treaties and other sources of international law can be maintained, and to promote social progress and better standards of life in larger freedom.

And for these ends

to practise tolerance and live together in peace with one another as good neighbours, and to unite our strength to maintain international peace and security, and ensure, by the acceptance of principles and the institution of methods, that armed force shall not be used, save in the common interest, and to employ international machinery for the promotion of the economic and social advancement of all peoples:

Have resolved to combine our efforts to accomplish these aims.

Accordingly, our respective Governments through representatives assembled in the city of San Francisco, who have exhibited their full powers found to be in good and due form, have agreed to the present Charter of the United Nations and do hereby establish an international organisation to be known as the United Nations.

The United Nations Organisation consists of six principal bodies—the General Assembly, the Security Council, the Economic and Social Council, the International Court of Justice and the Secretariat.

Unicameral System. The system of government in which there is only one House of Legislature (opposite of Bicameral System).

Unitary State. A state wherein authority emanates from the centre. The units have practically no powers and are controlled in every respect by the centre.

Universal State. The idea favoured by many present-day thinkers for the abolition of single states and establishment of an International or Universal State.

Unwritten Law. Term used for the principle that has got the same force as a law, although it is not included in any code of law. It is an unwritten law, according to the view that a husband may kill the seducer of his wife without being punished.

V. E. Day. Victory in Europe Day (the 8th May, 1945) during World War II.

V. J. Day. Victory over Japan Day (14th August, 1945).

Veto. The power of rejecting a decision or a proposed law.

Vote. The right of an individual to express the opinion, especially at an election, in favour of a candidate. There are the following systems of voting:—

(*i*) *Single Non-transferable Vote.* A voter has only one vote which he may cast in favour of any one of the candidates seeking election.

(*ii*) *The Distributive Vote.* A voter has as many votes as there are seats, but he is entitled to give only one to any one candidate.

(*iii*) *The Cumulative System.* This system allows each elector to haveas many votes as there are seats vacant, and to cast his votes as he wishes. Thus, if there are five representatives, he may give all his five votes to any representative, or four to one and one to another, and so on. This system is known popularly as "plumping," when all votes are given to one candidate.

(*iv*) *Plural Voting.* See "Plural Voting" on page 597.

(*v*) *The Weight Vote.* This is another form of plural voting, under which persons who have greater interests at stake, or persons better qualified to vote, receive more votes than those less qualified or who have smaller interests. One type of this is the University vote whereby a University graduate receives a vote as a university graduate in addition to a vote on other grounds.

War Criminal. One accused of atrocities during a war for which he is usually tried by the victorious nation.

Weightage. Safeguard given to a minority community by giving it more representation than it is entitled to on the basis of its population.

Whip. A member of Parliament, who is charged by his party with the organisation of voting. When a division is on, the whip is responsible for the presence of a sufficient number of members to carry the vote through. There are also "free votes" in which the parties give members a free hand and the "whips" do not come into action.

White Army. The Russian anti-revolutionary army in civil war of 1917-18, so called in contrast to the "Red" army of the Communists.

World Health Organisation (WHO). World Health Organisation is one of the most important specialised agencies, established to raise the standard of health and well-being of all peoples. Its headquarters is at Geneva.

WHO is available to assist governments in strengthening their health services, to furnish technical assistance and to promote, in co-operation with the other appropriate specialised agencies, the improvement of nutrition, housing, sanitation, recreation, etc. It is authorised to promote and conduct research in the field of health, to promote improved standards of medical teaching and training, to establish international nomenclatures of diseases, to standardise diagnostic procedures and to establish international standards with respect to food, biological and pharmaceutical and similar products.

White Paper. A document issued by the legislature of a country giving detailed information on a matter of public importance.

White Russia. One of the Republics of the Soviet Union, lying on the south-western frontier and inhabited by white Russians, as people speaking a language distinct from but akin to Russians and Ukrainians.

Whiteman's Burden. A phrase denoting the self-imposed burden of the 'white nations' who consider it their responsibility to 'civilize' the backward peoples of Africa and Asia.

Woolsack. The seat occupied by the Lord-Chancellor in the House of Lords, as its President.

Yankee. Used for the citizens of the U.S.A.

Yellow-dog Contract. A popular American term for contract between employer and employees whereby the employee undertakes not to join a Trade Union. Such contracts were forbidden by an Act in 1935, but attempts continue to be made for this sort of contracts in modified or unofficial forms.

Yellow Peril. The danger of Japanese Imperialism just before World War II. The American tendencies towards imperialism are, sometimes, referred to as "Yankee Peril" these days.

Young Turk. A member of the "Young Turks Reform Party"—a national movement in Turkey.

Zionism. A movement among the Jews to restore a Jewish State.

EXAMINATION QUESTIONS

WITH BRIEF SOLUTIONS

1. *What is meant by "veto"?*

The Security Council consists of 11 members of United Nations. The Republics of China, France, the United Kingdom, United States and the USSR are five permanent members and six non-permanent members are elected by the General Assembly. Each member of the Security Council has one vote. Decisions of the Security Council on all matters, other than procedural, require an affirmative vote of seven members including the concurrent vote of the permanent members. Unless the permanent members of the Security Council agree no decision can be made. If one permanent member votes against a proposal, it is "vetoed". Russia has been using the veto power very frequently.

2. *Give a brief answer to the following:*

(*i*) *Closure* (*ii*) *Bootlegger* (*iii*) *Contraband of war* (*iv*) *Economic Front* (*v*) *Idealism* (*vi*) *Guild Socialism* (*vii*) *Whitehall* (*viii*) *White House* (*ix*) *Appeasement Policy* (*x*) *Self-determination of Nationalities.*

(*i*) Closure—The closing of a debate in a legislature by the vote of the House.

(*ii*) A person who sells liquor where its sale is prohibited.

(*iii*) Goods, the delivery of which to a belligerent may be objected to by another belligerent.

(*iv*) Apart from the striking capacity of a belligerent country her material resources and economic position do count a lot in time of war. The idea is that enemy countries are opposed to each other on an "economic" as well as military fronts.

(*v*) Metaphysically, idealism is the doctrine that maintains that mind or thought is the fundamental reality. Ethically, it means devotion to moral ideals. In Art, it usually means representation of things as we think they ought to be rather than as they actually are (realism).

(*vi*) A school of socialistic thought in England led by G.D.H. Cole, advocating a synthesis of socialism and syndicalism, with industrial self-government through Trade Unions, on lines suggested by the medieval guilds with abolition of the wage system.

(*vii*) Seat of British Government in England.

(*viii*) Official Residence of the President of the U.S.A.

(*ix*) It means the *compromising policy adopted by Great Britain and France before the World War II towards Hitler and Mussolini*. The recognition of the Italian conquest of Abyssinia, German annexation of Austria, General Franco's Government in Spain, Munich Agreement, etc., illustrate this policy.

(*x*) Self-determination is the view that each nationality has the right to determine its own destiny and mode of living. President Wilson was a great advocate of this view.

3. *Distinguish between the following:—*

(*i*) *Civil Liberty and Political Liberty*, (*ii*) *Local Government and Self-Government*, (*iii*) *Chancellor of the Exchequer and Lord Chancellor*, (*iv*) *Fabianism and Communism*, (*v*) *King and Crown*.

(*i*) Civil liberty (also known as 'Individual liberty') consists of the *proper safeguards of the fundamental rights of individuals*. The scope of civil liberty includes the *individual's right to life, property, contact, freedom of speech, conscience, religion*, etc. Moreover, the scope of civil liberty is vast enough to include even the aliens. Civil liberty, therefore, means the utmost freedom of action that an individual is entitled to enjoy within his rights.

Political liberty implies *individual's right to a share in government powers* and shaping the policy of the Government. In democratic countries those who have the right to vote enjoy political liberty. Aliens and minors, for example, do not enjoy political liberty. Thus civil liberty may be enjoyed alike by all; political liberty is relatively limited but in full democracy it is enjoyed by all adults except some lunatics, convicts, etc.

(*ii*) The modern state is divided into small areas and each area charged with the performance of specific duties peculiarly necessary or suitable to it. The authority that administers those areas is known as the local government. It is amenable to the control of the central government whose

creation in fact it is. The functions of local government therefore are confined to a defined locality. Self-government, on the other hand, implies "Government of the people for the people and by the people."

(*iii*) The Chancellor of Exchequer is the title of the British Minister of Finance. The Lord Chancellor is *the head of the British Judiciary and is also President of the House of Lords.*

(*iv*) Fabianism implies an evolutionary and democratic system of Socialism. Its philosophy is idealistic and not materialistic like the Marxian one. The emphasis of Communism, on the other hand, is on revolution, violence and class war.

(*v*) There is a subt.. distinction between the 'King' and the 'Crown' in the vernacular of British Government. The King is a person and the Crown is an institution. The king as such cannot exercise the powers associated with his office. He cannot in certain cases even marry a woman of his own choice. The powers of the Crown, on the other hand, are real. But the Crown in this sense is King-in-Parliament.

4. *What do you know of the following organs and agencies of the United Nations Organisation:—*

(*i*) *General Assembly* (*ii*) *International Court of Justice,* (*iii*) *F.A.O.,* (*iv*) *I.T.O.,* (*v*) *I.M.F.,* (*vi*) *I.L.O.,* (*vii*) *International Bank for Reconstruction and Development?*

(*i*) *General Assembly:—*

The General Assembly of the United Nations is one of the six principal organs of the United Nations and the only one consisting of all the members of the Organisation. The General Assembly meets annually in September, and can be called into special session by the Secretary-General at the request of the Security Council or a majority of the members of the United Nations.

The General Assembly takes stock of what has been done by the other principal organs, makes recommendations for future developments, elects members of the Councils, admits new members, approves the budget, and so on. It has the right to discuss matters within the scope of the Charter or concerning

powers and functions of any organ of the United Nations. It may make recommendations to the members of the United Nations or to Security Council, on any such question. Since the Security Council is the organ of the United Nations, primarily responsible for the maintenance of peace and security, the General Assembly cannot make recommendations on a dispute or situation which is being dealt with by the Security Council.

For practical purposes the General Assembly splits up into six main committees of the whole; that is, each committee has fifty-eight members. The committees usually known by their members are as follows:—

I. Political and Security.

II. Economic and Financial.

III. Social, Cultural and Humanitarian.

IV. Trusteeship.

V. Administrative and Budgetary.

VI. Legal.

Decisions in the committees are by simple majority of those present and voting.

(*ii*) *The International Court of Justice:—*

It is the principal judicial organ of the United Nations. All members of the United Nations are automatically parts to the Statute of the Court, and bind themselves to comply with the Court's decision in any case to which they are parties. The Court can take action of two kinds. It can deliver judgements in contentious cases (only states can be parties) and it can give advisory opinions on legal questions.

The Court consists of 15 independent judges elected for a nine-year term. Questions are decided by a majority of the judges present. A decision has no binding force except between the parties and in respect of a particular case. There can be no appeal against the decision of the Court.

The Court is in permanent session—that is, it is permanently available except during judicial vacation. The Hague is the headquarters of the Court.

(*iii*) *Food and Agriculture Organisation* (*F.A.O.*)

The organisation was established to pool and impart information relating to nutrition, food and agriculture; to recommend international action. Among other things, on the conservation of natural resources, the improvement in the methods of agricultural produce, and the improvement of processing, marketing and distribution of food and agricultural products. Members of F.A.O. undertake to do their best individually and collectively for raising levels of nutrition and standards of living of their people.

(*iv*) *International Trade Organisation* (*I.T.O.*)

It is one of the proposed specialised agencies of the United Nations. It is designed to do the very important job of increasing economic activity throughout the world by reducing trade barriers and removing discriminatory trade practices, which have seriously hampered the flow of trade. An agreed charter of an I.T.O. was drawn up at Mahana by representatives of 52 nations and submitted to their respective governments for ratification.

(*v*) *International Monetary Fund* (*I.M.F.*)

Dollars, pounds, zloties, rupees and the rest of the world's currencies are concern of this specialised agency established with the International Bank for Reconstruction and Development. The main purpose of the Fund is to promote foreign stability, to maintain orderly exchange arrangement among its members, and avoid competitive exchange depreciation.

Members undertake not to alter the agreed par value of their currencies without asking the Fund first, and undertake to keep their foreign exchange rates within 1 per cent of agreed par value.

(*vi*) *International Labour Organisation* (*I.L.O.*)

A specified Agency which has survived in its original form from the peace treaties after the 1914—18 war. It was an autonomous institution associated with the League of Nations.

The I.L.O. was created on the understanding that universal peace can be established only if it is based on social justice, and that unjust conditions of labour imperil the peace and harmony of the world. The main object of the organisation,

therefore, is the improvement of working conditions of labour through international agreement.

(*vii*) *International Bank for Reconstruction and Development* (*I.B.R.D.*)

Like the International Monetary Fund, the International Bank for Reconstruction and Development was the outcome of the Bretton Woods Conference. Among the purposes of the Bank are:—

to assist in the reconstruction and development of member territories;

to promote private foreign investment;

to promote long-range balanced growth of international trade;

to assist in bringing about a smooth transition from war-time to a peace-economy.

The authorised capital of the Bank is $10,000,000,000 in $100,000 shares available to member-Governments only.

5. *Do you think it is useful to have two Houses in Legislature? Discuss the functions of the Second Chamber.*

Political experience condemns the unicameral system and even the most ardent champions of popular rights hesitate before condemning the bicameral system.

The reasons for the existence of two-chambered system are many. The chief one is the prevention of hasty legislation. Another reason in favour of the second chamber is the representation of interests and minorities. The Upper House usually consists of specially able and experienced men who keep in view the interests of the nation as a whole. In a federal state, the Upper House constitutes the representatives of individual states, who represent their states without ignoring the interests of the federation.

6. *Explain the following briefly:—*

(1) *Bicameral*, (2) *New Deal*, (3) *Collective Security*, (4) *Munich Agreement*, (5) *Monroe Doctrine*, (6) *Plebiscite*, (7) *Stay-in-strike*, (8) *Mandate*, (9) *Popular Front*, (10) *Casting Vote*, (11) *Plural Voting*, (12) *Balfour Declaration*, (13) *Referendum*, (14) *Joint Responsibility*, (15) *Constituent Assembly*, (16) *Four Freedoms*, (17) *Lend and Lease Policy*, (18) *Open-door*

Policy, (19) *Territorial Waters*, (20) *Unwritten Law.*

7. *Distinguish between the following:—*

(1) *Socialism and Commupism*, (2) *State and People*, (3) *Nation and Nationality*, (4) *States and Government*, (5) *Federation and Confederation.*

(8) *What do you know about the following:—*

(*i*) *Anti-Semitism*, (2) *Entente Cordiale*, (3) *Democracy*, (4) *Pan-Arab Movement*, (5) *Pan-Islamism*, (6) *Pacifism*, (7) *Speaker*, (8) *Autonomy*, (9) *Centralism*, (10) *Confederation*, (11) *Filibastring*, (12) *Quisling*, (13) *Whip*, (14) *Sovereignty*, (15) *International Law?*

9. *What are the following:—*

(*i*) *U.N.O.* (*ii*) *Security Council*, (*iii*) *W.H.O.?*

10. *What do the following signify:—*

(1) *Syndicalism*, (2) *Fascism*, (3) *Laissez-Faire*, (4) *Totalitarianism*, (5) *Federation*, (6) *Blitzkrieg*, (7) *Money Bills*, (8) *Diplomatic Front*, (9) *Fifth Column*, (10) *Blue Books*, (11) *Neutrality*, (12) *Woolsack*, (13) *White House*, (14) *White Paper*, (15) *Select Committee*, (16) *Republic*, (17) *Adjournment*, (18) *Residuary*, (19) *Sanctions*, (20) *Status Quo?*

N.B. For answers to questions 6 to 10, please consult the chapter.

PART VII

BUSINESS, ECONOMIC AND LEGAL TERMS

BUSINESS, ECONOMIC AND LEGAL TERMS

Abandonment is a marine insurance term implying the "constructive total loss" of a vessel and its transfer from the original owner to the underwriter. Legally, it means the relinquishing of interest or claim.

Abatement. A decrease, modification or suspension as of taxes, or a legal claim.

Ability in Taxation is one of Adam Smith's rules of taxation. It requires that the individual should contribute towards the expense of state in proportion to his ability, *i.e.*, according to the revenue earned under protection of the state.

Above par. Above normal value.

Account Days. Days set apart by the Stock Exchange Committee for the settlement of bargains entered into by the members.

Acquittal is a judicial discharge from an accusation.

Active partner is one who takes an active part in the business he is concerned with.

Actuary is a person skilled in the calculation of the value of life, interest, annuities and life insurance matters.

Advice. Commercial or other information and intelligence conveyed by letter, wherein one party *advises* another of some business transaction done on their account.

Affidavit is a written statement given on oath in the presence of a magistrate.

Agenda (*Fr.* I do or act). A list of business items to be done.

Agent is one who is authorised to represent a principal or one who buys and sells for another.

All Rights Reserved is a printed intimation in literary work. It notifies that the owner of the copyright has legally

protected his rights against violation.

Alibi is a legal term, for the defence of a person accused of a crime, by which he offers evidence that when the act took place he was at the place too far from the scene of the crime to have possibly committed the crime with which he is charged.

Annuity (*Annus*, year). A sum of money paid or received annually for some fixed number of years or for life.

Appreciation of money is rise in the value of money that is caused by a fall in prices of goods.

Arbitration is settlement of a dispute by a disinterested person or party.

Articles of Association. Rules and regulations of a company for its internal regulation.

Assessment is valuation of income, property, etc., for the purpose of taxation.

Assets. The whole property, in money or in material kind, available for payment towards liabilities or debts.

Assignment. A transfer, by deed or other instrument, of any property or right, a title or interest in property.

At call. Deposits with bankers, the payment of which may be demanded without notice.

At sight is a term used upon bills of exchange when they are payable on demand.

Attorney, Power of, is a formal document authorising one person to act for, or on behalf of another.

Auction is a method of selling property by competition.

Audit (*L. auditus:* a hearing). A searching examination at regular intervals of all books, accounts, vouchers, etc., by an auditor to see that they are properly kept and that no fraud has been committed by the party keeping them.

Average Due Date is an equated date on which payment may be made of amounts due on different dates.

Award. Judicial decision, judgment, especially of arbitrators. Payment awarded by such a decision.

Bail is the legal process of procuring the release of an

accused from custody upon pledge of surety for appearing in a court for trial.

Balance of Trade is the difference in the money value between exports and imports of a country. The balance is *favourable* when a country exports goods more to another country than it imports from that country. It is *unfavourable* when the value of imported goods of a country exceeds that of her export.

Balance Sheet is a statement of accounts showing assets and liabilities of any trading concern. It is prepared at fixed intervals—yearly or half-yearly—to show the financial position of a business.

Bank was originally a bench set up in the market-place for the exchange of money. Now it has come to signify an institution which receives deposits and extends credit in order to facilitate exchange, stimulate production and store up capital. One of the most useful functions of banking system is that it enables trading transactions on a vast scale to be carried out without any money actually passing between the traders, a mere *promise* to pay being substituted for currency. The banking system provides a clearing house in which traders' obligations and claims are brought together, cancelled out and settled. The banks provide capital which enables goods to be produced in anticipation of demand and thus assist in production.

Bank Bill is a bill of exchange drawn by one bank upon another.

Bank Draft is a form of cheque, a bill of exchange, drawn by a banker or one of his agents or correspondents. As any person can buy from a banker by drafts payable at required places, they form a convenient means of remitting money. They possess a certain security against fraud because the other bank is notified of the amount of the draft.

Bank Note is a promissory-note drawn by or on a bank.

Bank Ratio is the rate per cent, at which any central bank discounts notes, bills of exchange or advances loans on approved securities.

Bankrupt is a debtor who is unable to meet his engage-

ments, or pay his creditors in full and has been adjudgd a bankrupt by a court and has given up the whole of his estate to be realised, as far as possible, for payment of his debts.

Barter. Trade by exchange of one commodity by another.

Bear is a speculator who sells, for delivery on a certain future date, stocks, shares, or other securities which he does not possess. He expects to buy and supply them at a lower price before the delivery date arrives and thereby to make a profit on the transactions. He *sells for a fall in price.*

Bill of Exchange. *Vide* Exchange.

Bond is a sealed, written agreement of contract which one is bound to honour.

Bonus is an extra payment not earned, added to wages or dividents, when business has been good.

Boom is an upward rush of prices produced by active speculation.

Broker is an intermediary agent in the purchase and sale of any goods.

Brokerage is the name given to the commission which stock-brokers receive, in connection with the purchase and sale of stock.

Budget literally means a sack with its contents; a compact collection of things. Technically, it has come to mean a periodic list of income and expenditure aimed to govern the cost of maintaining a home or government. *Balancing the budget* of government is the adjusting of total income to total expenditure by means of taxation.

Bull is a speculator who buys for *a rise in price.* He contracts to buy stocks or shares in the hope that the price will rise. He hopes to be able to sell them at a higher price before the next settlement.

Bullion is uncoined gold or silver in bars, dust or groups.

Bye-laws are special regulations for working the affairs of any institution.

Capital is 'wealth used to help us in producing more wealth' or everything from which a person may expect

income. The word has also been defined as "produced means of production." The economist regards capital as the product of savings or the postponement of consumption and includes in it factories, raw materials in the hands of manufacturers and retailers, etc., that is, capital goods which help production of goods.

The popular conception is that the capital is a fund of value. The businessman thinks of his capital, usually, as money, or in terms of money. He is concerned with the capitalised value of his undertakings being the market value of his business.

Fixed Capital consists of all fixed assets, *e.g.* machines. Its function is not exhausted by a single use.

Circulating or *Floating Capital* consists of floating, circulating assets. It serves purpose only once like cotton, leather, etc.

Capitalism is an economic system in which *capital* or the machinery for producing wealth is controlled by private enterprise. Its opposite is 'Socialism' in which system the control of all capital is held by the society or state. To the Western countries, capitalism is a necessary and vital part of progressive civilization. There are various forms of capitalism. Capitalism controlled by a dictatorial government is *Tota Litarian Capitalism*; when controlled by business and banking interests it is *Fascistic Capitalism*. *Bureaucratic Capitalism* is the one controlled by government planners or bureaucratic capitalism, when capital is free and unfettered, with low interest rates and strict anti-monopoly enforcement against producers, traders and labourers, it is *Democratic Capitalism*.

Cash on Delivery (C.O.D.) denotes that a buyer must pay for the goods at the time of its delivery.

Cheque is an order for money, payable to bearer or to order, drawn on a banker. *A crossed cheque* is a cheque, as defined above, with the difference that there are two parallel lines drawn across the cheque, and between the lines the words "& Co." are written. This acts as a safeguard, for such a cheque will only be paid to a person known to the banker. *A dishonoured cheque* is one that the banker refuses to pay.

A blank cheque is one with the issuer's signature, but no amount of money having been specified. The recipient can fill in any amount of money he likes.

"*Not Negotiable.*" A cheque being a negotiable instrument, any *bona fide* holder can retain it, even though the cheque has been lost or stolen. To protect the owner against damage by loss or theft the words "not negotiable" may be written on the cheque by the drawer or the holder. The words mean that the article has no more right to it than had the person from whom he obtained it. Cheque sent by post should be so marked in a corner. If such a cheque is lost no one has any claim to it except the person to whom it was assigned.

Endorsement on Cheque (Latin, *dorsum*, back). Endorsing is the signing of the payee's name on the back of the cheque. Before a banker will pay a cheque which is not payable to the payee or · "bearer," the payee must sign his name on the back of the cheque. This can only be done legally by the payee or by a person authorised by him.

Circumstantial Evidence is an evidence based on circumstances which prove one's guilt very effectively.

Collateral Security is an additional security given by a debtor to secure fulfilment of an obligation or contract.

Commission. Compensation for transacting business.

Communism. See page 579.

Consignee is the person to whom goods are forwarded or consigned.

Consols is an abbreviated form of "Consolidated annuities" used on the stock exchange.

Contempt of Court is a wilful disobedience to a judicial court of legislature or manifest disrespect of such bodies. It also applies to refusal to carry out a court's order.

Copyright is the sole legal right to print or publish anything which belongs to the author or his assigns. The author of any literary work is entitled to the exclusive right of reproducing, translating or selling his work. It prevents others from copying or abstracting from or translating it after publication. It is not necessary that the word "copying" may be printed

on the book. The copyright of a book remains valid during an author's life-time and for a period of fifty years after his death.

Corner is a term used in the commercial world to designate a monopoly of the supply of marketable goods stocks, usually for future delivery, in order to increase prices so that the buyers can benefit. Individuals or groups acquire so much of a stock that they force others to buy from them, thus being able to set their own price. Cornering, which is successful, has tremendous influence on the market value, but it always stands the risk of being broken by competitive supply from other countries. In view of the fact that cornering carries evils—especially in the case of commodities for general use—some countries have declared it a crime.

Credit, Letter of. A letter of credit sent by a banker to his agent at another place authorising the agent to pay money not exceeding a maximum amount, to a third party, the bearer, on the guarantee of the banker. It is negotiable. Travellers commonly use letters of credit.

Credit Money. See under Money.

Credit Note is a statement sent to a persons howing the particulars of an amount in respect of which the creditor has been credited.

Creditor. One who has sent goods on credit or lent money. The person who has supplied these goods or money is a creditor until he has been paid for them.

Currency is a recognized medium of exchange, replacing the clumsy, primitive barter, issued by a government or its authorised agents. Currency may be either standard money of an intrinsic worth equal to its nominal value or token money, the intrinsic value of which is normally below its coinage value, like copper, cents, nickels or paper money. Metallic currency includes, besides in general circulation, bullion, *i.e.*, silver and gold bars. Paper currency is the promise of a government or its agents to redeem the promise in some stipulated standard coins.

Currency and Non-Currency. The medium of exchange,

or the circulating medium, consists of various kinds of instruments used for paying debts or purchasing commodities. The various instruments are of varying currency. Some of them have a general circulation, while others do not have a general circulation. The media of exchange can thus be classified into (*a*) the medium of general circulation of the currency and (*b*) the medium of restricted circulation or non-currency. The first, the currency, consists of metallic money of all kinds. It includes paper money of all kinds. The latter consists of credit paper like cheques, bills of exchange, promissory-notes, etc., which generally, do not circulate.

Current Account is the amount of money a person deposits at a bank, on which he can draw or add as much as he may desire. No interest is paid by the banker on this amount.

Customs are government taxes levied on imports and exports.

Days of Grace are the days, usually three, which are allowed to elapse after a bill becomes due, before payment is demanded.

Debenture is a written promise, a bond, to pay a specified sum on a given date with interest. Debentures are issued by a government, company or corporation to raise money. Debentures secured by a mortgage on the property of the company issuing them are called "Mortgage Debentures." Debenture holder is a creditor of the company and not a shareholder, and is entitled to interest whether or not profits are earned.

Debt, Public. Public debt is the sum of money obligations of a government expressed in bonds or notes bearing interest and due dates. It is incurred as a help to other sources of public revenue. Very often it becomes necessary to incur debts, as for example in conducting a war, in doing productive works, in financing projects of general social advantage, in supplementing taxation when it fails to get the necessary revenue in meeting unforeseen emergencies.

These loans may be raised in different forms. If the loans are floated within the country, they are called *internal debts*. But the government may also borrow from foreign countries. In this case the loans are called *external debts*.

Debts, Funded. Funded debts are those loans which will be repaid only after a sufficiently long period of time, *e.g.*, the 'consols' issued by the British Government.

Debts, Unfunded or Floating Debts are those loans which are repayable within a short period of time (say a year). Treasury bills which are paid off within three months and the ways and means of advances, are examples of unfunded debts.

Deed means something done. In legal sense it is a writing under seal.

Defamation is injury to one's good name or reputation. If it is by means of spoken words it is known as 'slander'; if in writing, it is called 'libel'.

Deflation is a reduction, a deliberate reduction, in the amount of money in circulation, so as to cause a sudden fall in prices. This is exactly the opposite of inflation.

Demand Draft is a bill of exchange payable on demand.

Demurrage is a fine which is payable for failing to clear goods from a storehouse either railway or marine, within a specified period.

Depreciation of Money is a fall in the value of money brought about by a rise in the general level of prices.

Detenu is a person detained in custody.

Devaluation. Devalue is to reduce (currency, etc.) in value. This is done legally by reducing the amount of gold represented by the currency unit. Consequently a unit of devalued currency buys less foreign currency. The goods of other countries which have not devalued, therefore, become dearer and imports into a devalued area are discouraged. But devaluation facilitates exports, as it cheapens goods in foreign currencies. Devaluation also raises very low prices and stimulates business enterprises, and reduces the actual value of public and private debts.

In September 1949, England devalued its currency and many countries, including Bharat, followed and devalued their currencies. Pakistan was one of the very few states that did not to devalue the currency.

Discharge. To acquit or set free.

Discount is a deduction of an allowance, made on a bill or any other debt not yet due, in consideration of present payment.

Dividend (*Dividendum* from *dividere*, to divide). A dividend is a share of profits of a joint stock company, the profits being *divided* among the shareholders periodically.

Division of Labour. See under Labour.

Dollar Area is Canada and the United States of America where payments for exports are accepted only in Dollars.

Domicile is the place where a person has his true, fixed, permanent home.

Double Entry is a system of bookkeeping in which each transaction requires two entries to be made in account books.

Draft is an order to a person to pay a certain sum to a certain person.

Dumping is the sale of goods abroad at prices lower than those prevailing in the home market. This is made possible by large-scale production or higher prices for home consumption. This is done with a view to under-cutting the producers in the importing country. The value of dumping is said to be that it enables industry to maintain a high level production.

Earnest Money is money paid in token of a bargain made.

Easement is a legal term for the right over the property of another, such as the right of way, light, air drainage, support of buildings, etc.

Economics. The word Economics is derived from a Greek word (*oikos*, a house, *nomos*, a law) meaning House-keeping. Nowadays the word has much wider sense. Economics is defined as a social science dealing with the production, distribution, exchange and consumption of wealth. It concerns market values, prices, money, wages, interest, rent and profits.

Economic Crisis is downward turning point in the prosperity of a country. It is a breakdown in the industrial financial situation.

Economic crisis may be causea by war, by overconfidence which has led to gradual over-expansion during a long period of non-spectacular feeling and well-balanced success and which now is shaken by crop failures, other disasters, threat of war, etc., or by the inevitable after-effects of some exaggerated boom period.

The first symptom of economic crisis is the weakening of some major financial, industrial, agricultural or commercial factor in the national life. This causes in certain circles restricted credit and diminished buying power. This leads to loss of markets, accumulated stocks of goods, overstocked factories, cancelled orders for raw material, unemployment, enforced selling at a loss, bankruptcies, etc.

In an industrial crisis things do not sell at their cost of production, and sometimes they sell even at prices lower than that. Consequently, industries have to keep idle. A financial crisis means that the banks have unduly inflated their credit previously and that banks have failed owing to unsound business and that there is an unusual scarcity of money, in the money market.

If panic is added to the situation, people begin to sell hastily their property whether tangible goods, estate or stocks and bonds. The idea is to save themselves from approaching loss. General feelings of unrest and discontentment prevail which usually burst into strikes and other disturbances. Relief agencies, both private and governmental, are taxed to their utmost to mitigate the suffering and supply the needs of the idle. History has shown that gradually the upward swing begins almost unnoticed through the needs for goods and consequent re-employment.

The last War brought about economic crisis in several countries. The relief organisations are still at work in various parts of the world.

Economic Planning is scientific and well-thought out development of economic resources of a country or region so as to achieve maximum benefits.

Economic Wealth. See under Wealth.

Embargo is an order issued by a government to prevent

the arrival or departure of a ship or restrict the import or export of specified goods, sometimes enforced in times of war. In a legal sense it is an authoritative order to prevent the removal of property, pending some judicial proceedings against the owner.

Endorse is to sign one's name upon the back of a cheque, promissory-note, a bill of exchange, a warrant, delivery order, etc.

Endorsement is anything written upon the back of a document.

Endowment Policy. In insurance, endowment policy is a policy on which the number of premiums to be paid is fixed.

Exchange in its literal sense means the exchange of one commodity for another commodity directly. In economic terminology this is called *barter*. Exchange in economics means not only transactions in the nature of barter but also of goods or services for money, whether paid for by cash, cheque, bill of exchange or draft.

Exchange, Bill of. Bill of Exchange is an unconditional order in writing, addressed by one person to another signed by the person giving it, requiring the person to whom it is addressed to pay on demand or at a fixed or determinable future time a sum of money to, or the order of, a specified person to the bearer. After being signed ("accepted") it is returned to the drawer.

Exchange Bank is a bank concerned only with monetary exchange with foreign countries.

Exchange Control is the system under which all the foreign currencies earned on account of exports or services rendered to foreigners are credited to a country's central bank and can be utilised for imports in accordanc with the fixed government policy. The banks purchase and sell foreign currencies at the rates fixed officially.

Exchange, Foreign. Foreign exchange is the buying and selling of foreign currencies and Bills of Exchange. The rates of exchange are the prices at the various national currencies in terms of other national currencies.

The chief factor which determines the rate of exchange between two countries is the 'balance of trade'. As for example, if Pakistan and Britain are concerned and the imports into Britain from Pakistan are greater than the exports from Britain to Pakistan, then the balance of trade will stand at the credit of Pakistan. She will fix a rate of exchange favourable to herself as Britain has to remit money to Pakistan. Another great factor which helps to determine the real rate of exchange is the inflation or deflation of currency.

Fluctuations which take place in the foreign exchange are the necessary result and the certain index of the inequalities which exist in the balance of indebtedness of different periods between nations. As a result of international commerce, a certain portion of the community becomes indebted to merchants in foreign countries, and in order to save trouble, risk and expenses of sending coin, it seeks out another portion of the community to whom a similar amount is owing by the identical foreign countries concerned and, buying up those debts, assigns them over in payment to its own foreign creditors. And if the aggregate sum owing by the two countries to each other were absolutely equal—that is to say, equal in amount, coincident as to the period for settlement, and payable in an equal identical currency—there would be no difficulty of any kind.

Exchange, Stock. Stock Exchange is the market for purchase and sale of stocks, bonds and other securities; an association of share-brokers and dealers. The current prices are based on supply and demand, and available information. Stocks and shares have a very wide market, and communications between buyers and sellers take place on telephone, by telegram and by cable, if not in the Stock Exchange Hall. "The method of quoting shares, makingb argains and of settling transactions are absolutely fixed and widely known. These factors make the stock market best organised and nearest to perfection of all markets."

Stock exchanges are maintained in the financial centres in many parts of the world. Trading on exchange is done only by members who buy or sell for customers or on their own account. In normal times, the transactions of a stock

exchange exert a stabilizing influence on business generally. But when speculation is taken to extremes and heavy volume of liquidation takes place, it is sometimes found advisable to close stock exchange.

Excise Duty is a tax levied on certain articles produced and consumed in a country, and on licenses for certain trades.

Exports is a collective term for all goods and articles of commerce sent from one country to another.

Eviction or **Ejectment** is the legal proceeding whereby a person is dispossessed of his premises.

Fiat Money. See Money, Fiat.

Fixed Capital. See Capital.

Floating Debt. See under Debt.

Floor Price is the minimum price of a commodity fixed by a government. This is done with a view to saving the interests of producers of raw materials.

Foreign Bill is a bill of exchange drawn on an acceptor in another country.

Foreign Exchange. *Vide* Exchange.

Forfeiture is a penalty whereby a person, as a result of some illegal act, loses the title to his property.

Forgery is the fraudulent making or altering of a written or printed document with intention of deceiving anyone to that person's detriment. It is not necessary for any person to have been actually harmed thereby, since the crime exists in the intent and possibility of damages.

Free on Board (F.O.B.) When goods are sold "F.O.B." it means that the seller puts them on board the ship free of all carriage and shipping expenses to the buyer.

Free Port is a port where no export or import duties are levied.

Free Trade. See under Trade.

Freight is the amount paid for carriage of goods by steamer, railways or airways.

Fundamental Debt. *Vide* Debt, Funded.

Guilt-edged Securities are stocks on which interest is absolutely safe: investments which can never lose, *e.g.*, Government paper.

Gold Standard is monetary system in which gold coins may circulate in a country, or if gold coins do not circulate it is a system whereby bank-notes or other forms of currency in circulation are convertible into gold at a fixed rate at any time and to any extent.

The main *advantage* of gold standard is its universal acceptability. The gold standard is the only international standard the world has ever known. Moreover, it is a check to inflation, because when the currency is linked with gold no more currency can be produced than what the gold reserve warrants. Price level, if it is linked up with gold, is subject to less fluctuation than when it is linked up with something else or nothing at all, as in a system of inconvertible paper currency. Besides, it secures the stability of the foreign exchange rates. The countries having gold standard can have international trade at a fixed rate of exchange.

The system is not without *disadvantages*. The greatest disadvantage is that the system is inelastic. Under this system currency expands or contracts with the supply of gold. A flexible standard, on the other hand, is one where the currency expands or contracts with the demands of trade, both internal and external. Moreover, if all countries of the world want to be on gold standard, there is not sufficient gold to meet the demands of every country.

Gold Exchange Standard. Under a gold exchange standard, gold does not circulate but is made available at a foreign centre for payments abroad. The advantage of such a system is that it is cheaper. Since it does require gold for internal purposes, it economises the use of gold, and is, therefore, suited to countries which are poor and cannot afford to use large amounts of gold for internal currency purposes.

Good-will is the good name of any business which is a valuable asset to it when it is up for sale. It is "nothing more than the probability that the old customers will resort

the old place"...."the benefit arising from connection and reputation."

Habeas corpus is a writ to a jailor requiring him to produce into court for full inquiry, the body of one detained in prison, and to state the reasons of such detention.

Hard Currency is a relative term applied to currency which is short in supply and cannot be earned except with hard efforts. When the exports of a country are more than its imports then the demand of her currency is more than its supply, and it becomes very difficult to earn currency of that country and her currency is known as hard currency.

Hearsay Evidence is an evidence at second hand, and as such it is not to be taken as conclusive proof by a law court.

Imports is a collective term for all goods and commodities brought into a country from some other nation or country.

Indemnity is a formal legal undertaking of responsibility against damage or loss in such circumstances as may be expressed.

Individual Proprietorship. In individual proprietorship business is owned and managed by one person. He takes personal interest in his business, for on him depends its efficiency, its gains and losses. He may take initiative without any delay. He can keep business secrets to himself. But there is one difficulty in this type of business. One individual, with the exception of a few, has not the enough capital to run it on a very large scale.

Inflation. When the amount of money in circulation is increased, unless that increase is accompanied by an equivalent increase in quantity of consumer goods in circulation, there will be an increase in prices. If this process goes on without an equivalent increase in all incomes, the standard of living will increase. This is *inflation.* Any rise in prices does not mean inflation. When prices rise in response to trade conditions, it is inflation. The term is also widely used to cover an increase in the amount of credit.

Inflation took place in a number of countries after the World War II. The currency had no gold backing and

was manufactured without any relation to gold reserves.

Inflation is a malignant politico-economical disease usually brought on by a government spending her income lavishly. In private life or in business, the same excesses result in (1) bankruptcy or (2) imprisonment, if the excesses are unlawful. In case of a government, officials are not legally responsible for spending public funds beyond sound credit limitations. Unless the deficit consequent upon such spending can be made up by levying new taxes, an unbalanced budget will result. Relief from this condition is often sought through the issue of new currency which is without adequate backing. As a result the prices rise, the wage earner's income is insufficient to meet his daily requirements, savings shrink in value: the worth of stocks, bonds and other investments shrink and a general hysteria sets in.

Injunction is an order of court forbidding persons against doing certain things.

Insurance Premium is a periodical payment towards an insurance policy.

Intestate is a person who dies without having made a valid will.

Invoice is a statement which sets forth full particulars as to the quantity and price of goods sold.

I.O.U. (I owe you) is a mere acknowledgment of a debt and does not require to be stamped or dated.

Joint Stock is stock held jointly or in company.

Joint Stock Company is a public company whose capital is formed of shares, and in which every share is liable for the amount unpaid on his shares. The shares of a joint stock company are transferable and they may be sold at any time.

Jury. A body of persons selected and *sworn in* as prescribed by law to declare and give true judgement on the evidence placed before them.

Labour means any human effort for the purpose of production; all forms of human activity, whether mental or physical, where these are applied at any stage in the process to the task of producing a finished article for the use of, or

consumption by, human beings. Labour may be *Manual*, *Intellectual* or *Directive*.

Manual labour is a form of energy which alters the position of matter, *e.g.*, the ploughman displaces the earth, the miller alters the shape of grains; the potter alters the shape of clay, and so on.

Intellectual labour. The intellect plays a very important part in the processes of production.

Directive labour co-ordinates, organises, plans and looks ahead.

Large-scale Production. See Production.

Lay Days is a term used in shipping to signify the number of days allowed to load or unload a ship.

Lease is a document relating to the letting of offices, houses, buildings or land for a term of years.

Leasehold is property held on lease.

Legal Tender. The authorised coins or payments may be legally tendered in payment of debt. A government makes coins, guarantees their weight and standard and compels the public to accept them in payment of debt; in other words, it makes the coins legal tender.

Letters of Credit. *Vide* Credit Letters.

Libel is a written, or recorded, as in pictures, expression of defamation tending to subject a person to ridicule or contempt. Proving the truth of a statement is usually a valid defence against libel charges. See also "Slander".

Life Insurance is a formal agreement of an individual with an insurance company under which the individual makes regular payments of premia for a certain period or till the end of his life whichever is earlier and in return the company pays specified sum of money to the person himself or to the legal or indicated heir.

Liquidation is the process by which a joint stock company is dissolved.

Limited Company is a company in which the liability of the shareholders is limited to the amount of their shares.

Lock out. When a dispute arises between an employer and labour, the employer, in order to prevent the entry of labour, locks out the business premises.

Marxism. See "Marxism" under Political Terms.

Moratorium. An emergency act authorising a government bank to suspend payment.

Market. According to Jevons, originally a market was a public place in a town where provisions and other objects were exposed for sale, but the word is generalised to mean "any body of persons who are in intimate business relations and carry on extensive transactions in any commodity." But in economic theory, market refers to a commodity or commodities which are bought or sold by a number of buyers and sellers. It does not refer to a place or a region. A group of competing buyers and sellers, and a single competitive price constitute a market. It is not necessary that the market of a commodity should be confined to space. If the competition is local, as in the case of perishable articles, *e.g.*, milk, vegetables, the competition is national, if, however, the competition is world-wide, as in the case of gold and silver the market is international.

Market Price of a thing means the value that prevails in the market during a short period, during which there is no possibility of adjusting the supply of a commodity to the influences of demand. Pressing events influence market out of proportions, as for example, on Eid festival, the price of milk may jump up to double the normal rates. The market price oscillates round normal price. Marshal has rightly compared normal value to the normal sea level and the market value to the abnormal sea level disturbed by tides and storms.

Martial Law is the use of power by military authorities as a result of war or when civil government authorities are unable to preserve law and order.

Mint Par Exchange is the rate which expresses the relation between the quantities of gold obtainable by the units of currency of two countries.

Money, as Ely Richard Theodore defined it, is "anything that passes freely from hand to hand as a medium of exchange and is generally received in final discharge of debts."

It includes metallic money and paper money notes issued by a government and by banks which are readily accepted by public and which pass freely from hand to hand as a medium of exchange. Money is best defined by stating its function. Money is what money does. Money is a means or *medium of exchange*, *i.e.*, it acts as a universal third commodity for which all goods are exchanged. Money is *a common measure of value*, everything has its value expressed in terms of money or has its price. Money is a *store of value*, *e.g.*, it embodies value, for either conveying it from one place to another or for keeping it from one time to another. It can be sent from place to place more easily than commodities, and it can as well be stored more easily for future use. The possessor of money owns a power which he can store up or utilise, just as he pleases.

Any commodity or token which performs these functions may be money, whether it be in the form of gold, silver, paper notes, or cattle and sheep. All these and many other things have been used for money in the exchange of goods, as a medium and as a measure of the relative values of the different things exchanged, and also as a store of wealth, though some of them served the last purpose less efficiently than others.

Money, Credit. Credit money refers to the paper currency notes against which an issuing authority keeps less than 100 per cent reserves in standard money. The issue of these notes is managed in such a way as to secure their convertibility into standard money.

Money, Fiat. Fiat money means inconvertible paper currency notes. It has no intrinsic value in itself. It is accepted because of the orders of the government. The paper currency notes in England and America are fiat money.

Money Market signifies the operations of all the bankers, brokers, discount houses and financiers in a city who carry on business in money. They sell and buy the commodity money. These financial institutions compete with one another for borrowing and lending money.

Money, Paper. "A coin is simply an order on every producer to hand to the bearer a certain quantity of goods and that order can be conveyed quite as well by a written paper, if there is the same sanction or authority behind the

written paper, namely, common consent upon which in the long run even the gold or silver coin depends for its value.

Paper money may be either convertible—the notes issued by a bank or a government, promising to pay immediately on demand the amount expressed on the paper, in coin—or, inconvertible notes by a government or bank for which specie is not obtainable on demand.

Advantages. The advantages of *Convertible* paper money are manifold. It economises the use of gold and silver, because with a small metallic reserve many notes come into circulation, and to that extent cost of procuring gold is saved, because there is no question of wear and tear in case of a paper money, as new paper at almost insignificant cost can be issued in place of the old one. It is much easier and less expensive to transfer it from place to place. The *Inconvertible* paper money has an additional advantage. Note being convertible into gold or silver, no reserve is required to be kept by a government for redeeming this sort of paper money.

Evils and Disadvantages. The evils of paper money lie in its abuse. So long as the amount issued is not in excess of the currency requirement of a country, there is nothing to fear, but anything beyond this is absolutely fatal. In other words, harm would arise when paper money is issued in quantity larger than the specie it displaces. Paper money, unlike gold and silver, cannot be exported or melted, consequently any amount which is issued beyond the needs for currency must remain in circulation. After the paper has driven out the coin, further issues go to swell the volume of home currency and accumulate like water in a pond that has no outlet." The defects are still more conspicuous in case of inconvertible paper money. As no gold or silver reserves are necessary to redeem notes into gold or silver, the currency authorities, in order to meet a deficit budget or for taxing the people without any cost of collection, are free to issue more notes—even more than the interests of trade demand. The greatest disadvantage is as regards foreign trade with other countries, because the rate of exchange fluctuates with the change in the value of paper currency. This fluctuation is to the disadvantages of both exporters and importers.

Money, Representative. The Representative Money is

generally issued by a government in the shape of notes and certificates. An equal amount is reserved in the form of standard money.

Money, Standard. Standard Money is the unit in terms of which all values are measured and all accounts are recorded in country, *e.g.*, rupee in Pakistan, $ in the U.S.A., and £ in England. It is usually a coin made of either gold or silver and contains the full weight of bullion. The face value is usually to the value of the bullion contained in each coin.

Money Token. Token Money is that kind of metallic money the face value of which is higher than that of the bullion contained in these coins. It is generally issued by a government in limited quantities so as to keep its value above its intrinsic worth. The rupee, the eight-anna piece etc., are examples of token money.

Monopoly (Greek *monos*, above, and *poleo*, I sell) is the sole power of dealing in anything. It is an exclusive right secured by one or more persons to carry on some branch of trade or manufacture.

Mortgage (literally *mort*, dead; *gage*, a pledge) is conveyance of property as security for a debt, which is lost or becomes *dead* if the money or the interest due thereon is not paid on a certain day.

Nationalisation is the taking over control, management and working of industrial and commerical concerns by the government.

National Debt or Public Debt is the entire debt of a country, or the various loans raised from time to time by a government for meeting expenses of a non-recurring kind. It consists of money which the government has borrowed from private individuals either guaranteeing them a certain fixed rate of interest upon it to be paid out of the taxes until the debt is redeemed, or granting them annuities for a term of years, or for life.

National Wealth. See Wealth, National.

Naturalisation is the process by which an alien becomes a subject.

Negotiable Documents. Such documents as are trans-

ferable by endorsement and delivery from one to another, such as bills of exchange, notes, cheques, dividends, warrants, treasury bills.

Nisi is a decree or order of court enforceable when the party has failed to show cause against the order.

Novation. Act of substitution of a new obligation for the existing one.

Paper Money. See Money, Paper.

Par is full or nominal value used in several commercial and financial senses. With stocks and shares there are two kinds of par—nominal and issued. When the price of stocks and shares is *higher* than that originally paid for them, they are said to be above par at a premium and when the price asked is *lower* than that originally paid they are said to be below par, or a discount.

Partnership is an association of a few persons. Each of them contributes either capital, or labour or both. They are entitled to shares in the business. They are all jointly and severally liable for all debts of the business. The liability of partnership is unlimited.

They have the advantage of raising sufficient funds to enlarge the business. But partnership is not without difficulties. In consulting all the partners before taking a step, serious delays and want of initiative may arise. On the death, insolvency or lunacy of a partner, the partnership has to be dissolved. The unlimited liability of each partner is a great disadvantage.

Patent is an exclusive right or privilege in something invented or discovered.

Perjury. False statement made under oath before a court of law.

Policy is a document given to the insured person by an insurance company. It contains the contract terms of insurance.

Pool is an association of firms manufacturing the same product, formed for the purpose of regulating and controlling the selling price of their product.

Power-of-Attorney is a document in which one person authorises another to act on his behalf in respect of matters specified in the document.

Preference Shares. See Shares, Preference.

Premium is something above the nominal or fixed price. It is also used to denote a periodical payment to an insurance company in respect of a policy insured. (Also see Insurance Premium).

Probate is an official proof of the legality of a will.

Production in Economics means creation of utilities: food and goods for use or consumption. Man cannot destroy matter nor can he create or produce matter. He can only change the shape or form of the matter. The carpenter, as for example, makes a chair out of wood. The timber is not produced by him. Nature has done it. He is only adding utility to the wood, which was previously usable as fuel. Thus, when a man produces he adds only utility to the things given by nature.

Similarly, when a man consumes, he does not consume the matter; he uses up the utilities which the act of production has previously added to the matter.

In modern complex civilizations adequate *distribution* must intervene between production and consumption. When all three are nearly balanced so that demand is promptly met by supply and supply is produced for distribution in no considerable excess of buying demand, the major economic problem of a country is in practical equilibrium.

Production, Large-scale. Large-scale production enjoys several advantages. These are: economy of skill, economy of machinery, economy of materials, economy of buying and selling of large quantities. A large-scale business is not very much affected by market fluctuations, because it can produce various types of commodities to meet the demands of various kinds of customers and is in a position to stand the competition of others. Moreover a large business can devote some part of its wealth for carrying out research work in suitable laboratories by employing scholars.

A large-scale business has disadvantages too. It may quite happen that there is a sudden change of taste and

there may not be any demand for the standardized product. In that case, the expensive machinery and the cost of setting up a large-scale business are all waste. Moreover, with the increase in the size of a firm, a time comes when efficient management becomes impossible.

Profiteering. Exacting exorbitant profits by charging high prices when a commodity is scarce.

Promissory Note. A Promissory Note is an unconditional promise in writing made by one person to another signed by the maker engaging to pay, on demand or at a fixed or determinable future time, a certain sum of money, to, or to the order of, a specified person or bearer. Promissory Notes are used chiefly for loan transactions. They are negotiable instruments.

Pronote is a written promise to pay a stated amount to a specified person or to bearer of a specified date or on demand.

Proprietorship. See Individual Proprietorship.

Protection is the policy of fostering home manufactures and produce by imposing taxes on imports.

Public Debt. See Debt, Public.

Public Finance is that branch of Economics which deals with the management of revenues, expenditures and debts of governments. Private finance, on the other hand, includes banking, insurance and methods of underwriting capital for private business. The essential difference between public and private finance is that while in the case of a private individual his expenditure is determined by his income, public authorities adjust their income to the expenditure.

There was a time when it was accepted that all civilized governments should tax and spend as little as possible. But now the aim of the States has become socialistic in a pronounced degree. It is not correct to cut public expenditure to the minimum. Taxes perform many useful functions. Public expenditure increases the national wealth indirectly. Money spent on scientific planning and new researches increases wealth of a country. Money spent on sanitation, education and other healthy activities of the State increases the productive efficiency of the labourers and thus adds to the national

dividend. Inefficient hands may raise taxes and spend them in a way harmful to the society. The correct principle is that the Government should impose taxes and spend money obtained by taxation in such a way as to obtain the maximum social advantage. The amount of public expenditure should not absorb unduly large proportion of income of the society. Unnecessary waste of money should be avoided. The expenditure should be elastic, increasing with the resources of the State and diminishing with the decrease in resources.

Rate of Exchange. See Exchange.

Rates. Money raised by a local authority.

Royalty is a payment made in return for some transference of a privilege, *e.g.*, an author is paid a royalty on agreed amount periodically for the transference of the right in his book to the publisher.

Rebate is a discount, a disallowance, deduction from a sum to be paid.

Representative Money. See Money, Representative.

Sanctions. See Sanctions in the section on Political Terms. It has also come to mean an economic boycott of any Power that resorts to war contrary to its undertakings.

Sedition is any offence against the State next to treason.

Share. A share is the individual portion of a joint stock company's capital owned by a shareholder.

Shares differ from stock in that they bear distinctive numbers. They can only be bought as units.

Shareholders are those who hold shares in a joint property.

Slander is a verbal expression of defamation tending to subject a person to ridicule or contempt. See also Libel.

Slump is fall in the prices of stock.

Shares, Ordinary. Ordinary shares are shares on which dividends are paid depending on the profits made by the company.

Shares, Preference. On Preference shares certain rate

of interest is fixed and this must be paid before anything goes to the ordinary shares.

Sinking Fund is a fund created by regularly setting aside certain amounts to provide for a repayment by instalments of a definite liability, *e.g.*, a National Debt.

Sleeping Partner is one who has invested money in a business, but takes no active part in its management.

Socialism as defined by Fairchild Furness and Buck is "a programme of reform which repudiates private ownership of the means of production and competitive control of industry; it proposes a type of society in which productive capital will be owned collectively and economic activity will be controlled by authority. It is the name given to a large and varied body of political thought of which the main principle is common control of economic and financial machinery administered by the State in the interests of the majority of the community.

The capitalistic system is competitive. Competition in every sphere increases the cost of each enterprise. The socialists hold that competition is wasteful of resources and efforts and it results in strifes within and between nations. They argue that the cyclical fluctuations could be eliminated if competition would give place to planned economy, controlled and guided collectively. The international wars have their origin in competition among nations. Socialism condemns the institution of private property, because it breeds inequality and has very adverse effects on the process of production. Socialists condemn the institution of private property and competition because they think it destroys human liberty. The wage system is a kind of slavery. The great majority of the people are slaves to those few who control industries. Socialism requires people to work for the group as a whole and not for the few.

Socialists hold that the cause for degradation of mankind is its poverty. Wealth and welfare go together. Increase in national wealth and better distribution bring about happiness and prosperity of mankind. It tends to do away with the vices both of being very wealthy and very poor.

Anti-socialists hold that socialism destroys human liberty. Public control both of production and of consumption and

the type of work in which a man must engage himself necessarily means destruction of human liberty.

Soft Currency is a relative term applied to a currency which is available for exchange in large quantities, but it is not much in demand. This happens in case of a country the exports of which are less as compared to the imports from another country.

Specie is coined money of any description. The term is used to distinguish coins from bullion.

Speculation is the buying and selling of shares, securities, stock and commodities in a stock exchange with the idea of making a large profit in a short time by re-sale.

Standard Gold contains 22 parts of pure gold and 2 parts of copper melted together.

Standard Money. See Money, Standard.

Standard Silver contains 500 parts of pure silver, 400 parts copper and 100 parts nickel sterling (*steorra*, star, *steorling*, coin with a star) is the denomination given to English Money The British pound is called sterling on account of the figures of sterlings on the silver penny called the sterling.

Sterling Area. Countries whose currencies are closely connected to sterling.

Sterling Balances are the debt lying in sterling in the Bank of England which the British Government owes to the various countries. The undivided India earned heavy sterling balances. They accumulated owing to the fact that India had to incur huge war expenses on British armies. It was decided that all these expenses should be borne by Britain, because India was made a party to the war not because of her enmity with any foreign country but because she was a British possession. The British Government has all along been on the look-out to shake off this debt somehow or other.

Stock is capital consolidated in one mass and can be bought in any quantities.

Stock Exchange. See Exchange, Stock.

Strike is the term applied to the act of a body of workers refusing to work in order to secure higher wages, or for the redress of some grievances.

Summons. A call to appear in court.

Surcharge. An overcharge.

Surrender Value is the value of a life assurance policy at any time after premiums have been paid for three years. This value is assessed when the insurance policy is not fully paid up and the holder of the policy wants to be paid back. It is payable in a lump sum.

Tariff is a table of fixed charge; also list of articles upon which duties are charged by a government when exported or imported.

Tax. A rate imposed by a state on property or persons to meet the national expenses of the country.

Tender. It is an offer to supply certain things upon specified terms, perform certain acts, or pay a specified sum, but it is not binding until accepted.

Token Money. See Money, Token.

Toll. A tax for the liberty of passing over a bridge or road, selling goods in a market, etc.

Tout. A person who hangs about in a law-court and induces clients to entrust their cases to a particular lawyer.

Trade Balance. The phrase refers to the difference between imports and exports. A country the exports of which are greater in value than its imports is usually a creditor country, because it is selling more than it buys; and *per contra* a country which buys more than it sells is usually a debtor. But this is not always true. There may be other factors, *e.g.*, the cost of transportation, the interest on capital invested or lent abroad, foreigners, expenses on diplomatic services abroad which may vitally affect trade balance.

Trade Fluctuations. According to Hawtrey, "A trade cycle is composed of periods of good trade characterised by rising prices and low unemployment percentages alternating with periods of bad trade characterised by falling prices and high unemployment percentages." The cycle denotes certain amount of periodicity. It was claimed in early days that the time intervals between the phases of the cycle was from ten to eleven years.

There are various theories which have tried to explain trade cycles. Jevon's *sunspot theory* held that trade cycles were caused by "sunspot" because with their appearance the sun emitted less heat and made harvests comparatively poor. Consequently, the agriculturists purchased less goods. This resulted in depression.

Monetary theory of trade cycles holds that trade cycle is a purely monetary phenomenon. The banks create large amount of credit by lowering the rate of wages, interest and rent by business men. Consequently, the community is enabled to purchase more, and there is an increased demand for goods. In order to meet this demand production is increased, unemployment decreases, labourers get more wages and this further increases purchasing power of the community. When this process repeats, the prices rise gradually. Bank deposits are utilized and demands for loans increase. After a time naturally, under the principle of demand and supply, the bank rates will rise. This causes a panic; less demand, less production and more unemployment. Then, we have what is called a trade depression. During depression period business men require less money and reserves again begin to accumulate in banks. When they are sufficiently large, the rate of interest falls and the cycle restarts. The economists consider this theory inadequate, because it is not always that expansion of credit brings about expansion of business.

The *psychological theory* holds that the main cause of trade fluctuations is the variation of business confidence. When business is brisk, people get good profits and feeling optimistic about future prospect they overproduce. This causes industrial crises. When prices fall they become pessimistic about the prospect of their pessimistic estimate of future prospect of business causes wavelike movements in business activity.

There is another theory known as *theory of oversaving* or *under-consumption*, which also tries to explain trade cycles. This theory bases itself on the great inequality of incomes. The large proportion of the total amount of wealth is owned by a small class. During periods of brisk business and industrial activity, they save the major portion of their increased income. Consequently, a large part of community has less

to purchase goods which are being produced in large quantities. As there is wide difference in goods and purchasing power prices fall and trade depression follows.

Trade, Free. Free trade is international trade without import or export taxes. The main argument in favour of free trade is that it enables each country to secure the territorial division of labour, they will produce the goods for which they are best fitted. This leads to an increase in the world's productive power and cheaper prices all round. The interchange of goods leads to an interchange of ideas, and the recognition of interdependence among nations promotes peace and goodwill. The arguments against free trade are the protection of weak nations against the competition of strong nations by encouraging them (the weak nation). But it is very often that in order to make country self-sufficient in times of war and to protect internal industries, labour, etc., against foreign competition, suitable duties are imposed on foreign goods.

Trade Mark. It is a mark imposed on goods or the wrapper containing the goods to show that the articles bearing the mark are those of a particular trade. Trade marks are protected by law and it is an offence for a trader to use the mark of any other firm.

Treasury Bill is a bill of exchange issued by a treasury in return for money borrowed.

Trial Balance is a schedule as list of balances of accounts prepared to ascertain that total credits equal total debits and to make Trading and Profit and Loss Accounts and Balance Sheets.

Trade Union is an association of workers formed for the purposes of mutual help and improvement of their conditions of employment.

Truck is payment of wages in goods instead of in money.

Unfunded Debt. *Vide* Debt, Unfunded.

Warrant is a document authorising search, etc.

Wealth. To a layman it means money, hard currency. But in the wider sense, the word is synonymous with economic goods: commodities having exchange value, material posses-

sions measured by price. Wealth is scarce in relation to demand, it is transferable and is external to men. It must have utility. The word is not applied to necessities of life like air and sunlight, which are not bought and sold.

Wealth, Individual. Individual wealth is anything in the possession of an individual which is transferable for value.

Wealth, Collective. Collective wealth consists of those transferable and external goods which are public property, and can be enjoyed by every member of the community, *e.g.*, road, public buildings, etc.

Wealth National. National wealth includes the aggregate wealth of members of the community as also the collective wealth. Government loans and public debts are, of course, excluded; gold coin, gold ore, minerals, etc., are national wealth.

Wealth and Welfare. "An increase of wealth is not necessarily synonymous with increase of welfare." Income derived from unhealthy and immoral surroundings or from menial service, or from a dull, monotonous work may produce economic welfare which may be totally cancelled by the evil effects of such surroundings and conditions under which that earning is earned. Besides, much also depends on how the income is spent. Income spent on evils, such as on intoxicating wine, gambling and other harmful luxuries. An increased production of wealth adds to the welfare of the people, if this income is distributed wisely.

Writ is an order of court to an individual to appear at a certain place at an appointed time.

EXAMINATION QUESTIONS

WITH BRIEF SOLUTIONS

1. *What are profits?*

A small tradesman says that profits are the excess of selling price over cost price. Some economists maintain that they include an element of remuneration for the work of management together with interest on the capital invested and insurance against loss. The socialists maintain that profits consist of a portion of the product of industry, which the employer illegitimately takes from the worker. The advocates of the Co-operative Movement say that profits constitute an unfair element in prices and are, therefore, unjustly extorted from the consumer. Capitalists say that profits constitute the employer's legitimate share of the product of industry. All the same, there exists a surplus created by the excess of production over the cost of production. This surplus we call profit.

2. *What is socialist view of profits?*

The socialists regard profits "legalised robbery". They maintain that labour produces all value, and desire that commodities should have values in proportion to the labour required from them. Their doctrine of surplus value is that labour produces more than he gets and the surplus value which is produced by him is appropriated by the landlord, capitalist and the employer unjustly. As the entire value of a commodity is on account of labour, the entire value should go to the labourer. Therefore, that part of the value of a commodity that goes to the capitalist means so much robbing the labourer of his dues. This view is correct to some extent. It is also wrong to some extent. The value of a commodity on the supply side determined by the marginal cost of production which includes the earnings of all the factors of production, *viz.*, wages, rent, interest and profits. The business man co-ordinates land, labour, capital and undertakes the risk of producing commodities in order to meet the fluctuating demands of a dynamic society. He succeeds on account of his ability and as such must be paid for taking these risks and doing this service of co-ordination. This payment is what we call profit.

3. *Why are prices of commodities in different markets practically the same?*

Ready and rapid means of communication have developed and stabilized market transactions. If the price is temporarily raised in any market, goods flow in and the prices fall. If the price is low, goods are sent elsewhere.

4. *Why does the price of an article fluctuate?*

Prices go up or down for one or more of the following reasons:—

(*a*) *Change in the demand of commodities in general:* When the supply of article is fixed for the time being, an increase in general demand will invariably lead to a rise in prices. When the demand decreases, the prices may go down.

(*b*) *Change in the supply of commodities:*—When the demand for the commodities is constant, but their supply falls, the prices will go up; when the costs of production of articles increase, the demand remaining inelastic, prices are likely to rise. On the other hand, if supply increases, the demand remaining the same, prices will fall.

5. *How are market values governed?*

They are governed by the interaction of demand and the actual stock in the market. This is quite true in the case of perishable commodities like milk, fish, etc. These articles have to be disposed of with least possible delay. In case of other commodities, it is not necessary that they should be disposed of so early. Merchants who generally deal in these articles do not offer their stock on any one day. They do it all the year round. If owing to a fall in demand, the price falls below the cost of production, they withdraw the supply from the market and wait for the revival of demand. This, by itself, will exercise a check on the falling price. Similarly, if the demand increases the merchants will bring more to the market for sale. This will check the rise in prices to some extent.

6. *How are foreign exchange rates determined?*

Mint par of exchange is "the exact equivalent of the unit of one currency in terms of the currency of another, the relation being determined by quantity and fineness of the metal contained in the respective coins fixed by law."

The units of currencies in America and England although made of the metallic gold, are different in weight and fineness. The basis of comparison of one coin with another is the amount of pure gold in the respective coins, because pure gold in America is the same as it is in England. So, if we can determine how many dollars contain as much pure gold as sovereign we can find an equitable basis for changing our money for another. This is the unit par of exchange between the two coins.

The limit to the fluctuation in the rates of exchange between the two countries are fixed under stable conditions by specie points.

In foreign exchange rates, the cost of transporting specie is added or subtracted from the mint par of exchanges. Thus, there are two limits, the super specie point and the lower specie point. The rate of exchange fluctuates between these limits.

7. *Give a brief and lucid account of the chief causes of fluctuations in the rates of exchange between various countries.*

The rate of exchange between any two countries is the value of the coinage of one country in terms of coinage of the other country. This rate depends on several factors. The rate of exchange is affected by demand and supply of bills of exchange. If demand exceeds the supply the value of foreign money rises. The limit of the rise is given by the point at which it would be just as cheap for the debtor to send actual gold. Similarly if the supply exceeds the demand, the exchange ratio falls to the point at which it would be just as cheap for the creditor to send for the gold. Another cause is the balance of trade. If the balance is favourable to a country the value of its money in terms of foreign money rises. In case, however, it is unfavourable the reverse happens. Another cause which brings about fluctuations in the rate of exchange is the depreciation of money. Movements of gold from one country to another also affects the exchange giving a stimulus to exports or imports.

8. *What is the cause of circulation of money?*

The chief and the fundamental cause of the circulation of money and all kinds of media of exchange is the confidence

in their acceptability. Gold is more widely acceptable than any other kind of money; the reason is the universal confidence in the value. Money issued by a government and made legal tender is acceptable, because, on the one hand, people have confidence in the government and, on the other, they are sure that on account of the authority of the government, the money issued is acceptable by all its subjects.

9. *What are the functions of (a) the financier, (b) the stock-broker, (c) the banker?*

(*a*) The financier finds out fruitful avenues for the use of money. He helps to promote new industrial ventures and to stimulate the development of existing undertakings. He examines the possibilities of new inventions and endeavours to induce the public to subscribe the necessary funds for their development. Thus, his services may be summed up as (1) services to the investor; (2) services to industry, commerce and trade, and (3) services to the community.

(*b*) Streams of capital flow from all parts of the world and they normally flow into the stock exchanges which exist in the principal business centres. The stock-brokers seek out avenues of investment for the capital of their clients, and it is to the financiers that they turn to provide those avenues.

(*c*) The banker renders the following services:—

(1) Looks after the customer's money, (2) takes charge of his securities, (3) collects and receives his dividends etc., (4) makes regular automatic payments for him, (5) helps him to select his investments, (6) issues travellers' cheques and letters of credit, (7) acts as an executor and trustee, (8) lends money under suitable guarantees, and (9) assists a business by the machinery of cheque clearance.

10. *What do you understand by Malthusianism? Who was Malthus?*

Rev. Thomas Robert Malthus, F.R.S. (1766-1834), an English economist, was a clergyman. In his essay on *The Principle of Population,* he proposed to limit the increase of population by discouraging marriage and otherwise. The doctrine explains that at the normal rate of increase the population tends to increase faster than the means of sustenance

can, and that, therefore, society should check the growth of population by late marriages and self-restraint in sexual indulgence.

11. *Distinguish between the following:—*

(i) Hard Currency and Soft Currency, (ii) Token Money and Paper Money, (iii) Summons and Warrants, (iv) Imports and Exports, (v) Inflation and Deflation (vi) Joint Stock Company and Limited Company, (vii) Intellectual Labour and Manual Labour.

12. *Explain the following:—*

(a) Forgery ; Habeas Corpus ; Alibi ; Hearsay Evidence ; Indemnity ; Martial Law ; Power of Attorney ; Writ.

(b) Gold Standard ; Gold Exchange ; Market ; Market Price ; Standard Money ; National debt ; Protection ; Public Finance ; Foreign Exchange.

(c) Goodwill ; Invoice ; Lease ; Monopoly ; Mortgage ; Patent ; Premium ; Pool ; Pronote ; Royalty ; Speculation ; Strike ; Tariff ; Tender ; Trial Balance ; Balance Sheet.

13. *What do you understand by:—(a) Inflation, (b) Balance of Trade, (c) Sterling Balance, (d) Free Trade, (e) Money and its functions, (f) Profit, (g) Production, (h) Trade Mark?*

14. *What part is played by the banks in the economic life of a community?*

15. *Indicate what useful purposes are served by cheque system.*

16. *What is a cheque, crossed cheque, a dishonoured cheque, a blank cheque and bill of exchange?*

17. *Explain the following:—*

(a) A Bull (on the Stock Exchange), (b) a Bear (on Stock Exchange), (c) Balance Sheet, (d) Profit and Loss Account, (e) Joint Stock Company.

18. *Write brief notes on the following:—*

(a) Economic Crisis, (b) Joint Stock Company, (c) Tax, (d) Stock Exchange.

N.B.—For answers to questions from 11 *to* 18, *please consult the chapter.*

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(c) *Goodwill*; *Invoice*; *Lease*; *Monopoly*; *Mortgage*; *Patent*; *Premium*; *Pool*; *Pronote*; *Royalty*; *Speculation*; *Strike*; *Tariff*; *Tender*; *Trial Balance*; *Balance Sheet*.

13. *What do you understand by*:—(a) *Inflation*, (b) *Balance of Trade*, (c) *Sterling Balance*, (d) *Free Trade*, (e) *Money and its functions*, (f) *Profit*, (g) *Production*, (h) *Trade Mark*?

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N.B.—*For answers to questions from* 11 *to* 18, *please consult the chapter.*

PART VIII

MILITARY & WAR TERMS

MILITARY AND WAR TERMS

Adjutant (Lat. *adjutare*, to assist) is a regimental staff officer not above the rank of major, specially appointed to assist the commanding officer of a garrison or regiment. He assists in routine military details, correspondence, issuance of orders, etc.

Adjutant-General. The head of his department on the general staff of the army, the executive officer of the Commander-in-Chief. He is in charge of details of command, receives and publishes orders.

Admiral. The chief commander of a navy, a naval officer of the highest rank.

Aerial Camera. It is a camera used for taking aerial photographs.

Aero Bomb. A bomb dropped by an aeroplane.

Aeroplane. See page 308.

Air-base is a place from where air force units operate.

Aircraft-Carrier is a ship which carries, launches, lands and hoists abroad naval aeroplanes. Its full-length upper deck with mast, funnel, and guns arranged on one side, is flat to facilitate the launching and landing of planes. The funnel may be carried under the flying deck and the smoke discharged away by powerful fans. The space below deck is used as shed for aircraft, the planes being lowered or raised from the flying deck by elevators. When aeroplanes are leaving or returning, the carrier must be steered with or against wind, as a side wind would make the operation hazardous.

Air Gun is an instrument with which projectiles are fired by means of compressed air.

Air-Raid Precaution (A.R.P.) includes all safety methods employed by Civil Defence Department during enemy air raids.

Air-Raid Shelter is an underground shelter for the protection of civilians during an air raid.

Ambush. A hidden place from where a surprise attack is launched.

Anti-Aircraft Gun. A gun to shoot down a flying aeroplane.

Armada. A fleet of warships.

Armaments are military, naval and air force equipped for war, but chiefly munition such as big guns, fortifications, etc.

Armistice (*aarzi sulah*) is a truce or a suspension of military hostilities between warring factions. Usually it is a forerunner of peace proclaimed by governments or by the commanders-in-chief of the hostile armies.

Armour (*zarah baktar*) means of defensive arms or dress, helmets, tunics or cuirasses, graves or leg coverings, made of leather or metal. The Assyrians, Greeks, Romans and Etruscans used this sort of armour freely. In the 13th century, the entire armour began to be of chain mail. In the 17th century protective armour was given up and heavy firearms appeared, and it became inadvisable to use armour. During the World War I defensive armour was re-adopted and soldiers used steel helmets, steel shields, heavy breast-plates. And the practice of covering vessels, aeroplanes, automobiles with iron and steel plate became common.

Arms. A term for all types of weapons. Modern arms include the rifles, the bayonets, swords, bombs, grenades, machine-gun, etc.

Army. In broadest significance, it is a body of armed and trained men for military defence or offence.

Army Co-operation Craft. These planes are used for reconnaissance and planning offensive into enemy country. They carry bombs, petrol, etc. The also carry photographic camera.

Arsenal is a place for the manufacture, repair, storage and issue of arms, ammunition, etc.

Artillery (*topkhana*). The term at first referred to all projectiles (projectile is a body projected—thrown out or forward—by force, especially through the air, a bullet, ball or shell) for use in war. But now the term is

restricted to cannon and troops operating them. Artillery at present consists of field, siege, anti-aircraft, trench, naval, coast. Field artillery includes small-calibre pieces, howitzers, mortars. Siege artillery include the same pieces of large calibre. Coast and fort artillery consists of cannon of 10-16 inches calibre (the size of the bore of a tube (diameter). Anti-aircraft guns were developed in the World War I. Machine-guns that are light and which use rifle ammunition are not used in artillery class. Artillery transportation is done by machines, such as caterpillar tractors of automobile trucks.

Atom Bomb. See page 223.

Auxiliary Forces. Additional forces ready to serve in time of war.

Balanced Force includes suitable proportions of different branches of the armed forces.

Bale out is to descend from a damaged aircraft by means of a parachute.

Balloon Barrage. A number of balloons tied to cables are sent up into the air to prevent dive bombing and low flying by enemy aircraft.

Barbette. A sort of an elevated platform, from where heavy guns are fired.

Barracks. Buildings for housing soldiers, especially in garrison.

Barricade. A temporary fortification raised to hinder the advance of an enemy as in case of street fights.

Base. The point from which the operations of a campaign are conducted.

Base Complex. An air base for support of Air Force units consisting of landing strips and all components or related facilities for which the Air Force has operating responsibility, together with interior lines of communication and the minimum surrounding area for security.

Battalion. A unit of infantry, usually organised in companies, under a Lieutenant-Colonel. The usual strength of a Battalion is 800 soldiers.

Battery. A unit of horse and field artillery.

Battle Cruiser is a large heavily armoured warship with great speed and hitting power.

Battleship is a large heavily armoured warship mounting heavy guns.

Battleship Tank Tests. Propulsion system Tests using heavy walled propellant tanks to investigate problems in the engines and the propellant feed system. The heavy walled "battleship" tanks are required in order to permit repeated pressurization of the tanks to a level high enough to stimulate the acceleration head achieved in actual flight.

Belligerent. A state which is at war.

Billet. A ticket assigning quarters to soldiers.

Bivouac. The resting at night of soldiers in the open air instead of under cover in camp.

Black out is a precaution taken at night from air raids by extinguishing all external lights, and shading all other lights. The idea is to see that no light can be seen by the approaching enemy planes.

Blitzkrieg is a German word meaning lightning war. It is applied to the theory that a sudden, brisk and overwhelming attack will outwit the enemy.

Blockade. An attempt to cut off all supplies or commerce from a town or seaport during a state of war by surrounding the place with troops or ships. It is more important in naval than in military operations.

Bombers are meant to invade and bombard enemy country.

Bren Gun is a new type of machine-gun which is light and rapid.

Bren Gun Carrier. A light armoured car fitted with Bren Gun.

Brigade generally consists of three or four battalions of infantry for mechanised units, *i.e.*, cavalry or artillery units and armoured corps and other military formations.

Brigadier or **Area Commander.** A military officer in charge of a Brigade. He looks to the training, discipline, maintenance and command of forces in the Brigade.

Calibre. The bore of a gun.

Blanketing. The process of having a desired signal blanketed, or eliminated from reception, by the presence of an overriding, stronger undesired signal.

Build-up is the process of attaining prescribed strengths of units and prescribed levels of vehicles, equipment, stores and supplies. The term may also be applied to the means of accomplishing this process.

Cadet. A youth studying or qualifying for a commission in army, navy or air force. The word comes from diminutive of Latin *Caput*, the head of a junior branch of a noble family.

Camouflage is disguising troops or guns by using natural objects, such as branches of trees to afford cover from air raids, or at sea the painting of ships by eccentric paintings. Sometimes the disguise is achieved by smoke screen.

Cannon. A great gun for firing long range shot.

Canteen. A tin vessel used by soldiers for holding liquor; liquor shops in barracks of soldiers.

Cantonment. Permanent military town, distinct and at some little distance from the principal cities.

Captive Balloons are of great use in war for watching the enemy movements, observing the effects of artillery fire, taking photographs, making maps. They can be hauled down by wire-ropes or allowed to ascend at will.

Cartel. An arrangement for exchange of prisoners.

Cavalry. Mounted army equipped with swords, lances, etc.

Chevron. The V-shaped band of worsted braid or gold lace worn on the sleeve of non-commissioned officer's coat.

Chief of General Staff is one of the four principal Staff Officers—Chief of the General Staff (C.G.S.), Adjutant-General (A.G.), Quarter-Master-General (Q.M.G.), and Master-General of Ordnance (M.G.O.). He controls military policy, military intelligence, training disposition, strategical distribution of the army. He also plans military operations through the Director of Operations under his control.

Cipher. A secret kind of writing by changing the

arrangement of letters of a message, substituting other letters and figures. This is done to transmit secret information.

Colonel is commander of a regiment.

Commander-in-Chief has supreme command over all land forces.

Commando is a detachment of troops, which attacks the enemy at weak points and returns before the enemy is in a position to face the attack.

Commissioned Officer. An officer appointed by a commission—an officer of or above the rank of Lieutenant.

Commodore. A rank in navy intermediate between an Admiral and a Captain.

Conscription. Compulsory training of men for military service.

Company is usually one-fourth of a battalion. It is commanded by a Major or a Captain.

Convoy. Escort with armed forces; a ship or ships guarding a fleet of merchant vessels and bringing them safely to a port under the escort of supply lorries.

Corps. A division of an army forming a tactical unit.

Countermine. Mine or chamber excavated to counteract or destroy the mines made by the enemy.

Coup d'etat is a sudden change of government by force of arms.

Court-martial is a military court in which members of the army, navy and marine corps are tried for breach of military discipline or for offences against the Articles of War. Jurisdiction of court-martial extends to civilians upon the occasion of martial law being declared. The decisions of a court-martial are subject to review by the departmental commander.

Cruiser is a warship. It is sufficiently armoured for reasonable protection and equipped with guns large enough for good fighting efficiency. They are designed with marked stress on speed and fuel capacity. Cruisers came to be developed to a great extent in the last World War. A cruiser, now, is suitable for offence or defence, for guarding or aiding com-

merce or for fighting in battle line. The cruiser by its adaptability has now gained great naval importance.

Battle cruises have reduced armour, but they have as many guns of a maximum calibre as possible. Light cruisers, although lightly armed, are very fast, versatile boats.

Decode. To translate (the symbols in a code message) into ordinary language.

Depot. Stores for the supplies of ammunition, food and medicines.

Desertion. In military laws, desertion is absence without official leave, with no intention to return. Wartime penalty is usually death; and during peace, imprisonment for unexpired term of enlistment.

Destroyer is an evolution of torpedo boat. It is a small, very speedy, light naval vessel armed with torpedos, cannons, repaid fire gun, depth bombs. A destroyer is large and faster than torpedo; mostly using turbine engines. It can lay smoke screens. It is very important in fleet. A destroyer protects larger naval ships and merchant vessel from submarine attack.

Dive-bomber is a plane that dives down and comes very near to the target, drops bombs, and rises up quickly.

Division. A divison consists of three or more brigades and is commanded by a Divisional Commander, generally holding the rank of Major-General.

Divisional Commander is in military command of a Division. He is responsible for the training, administration and command of all units of which the Division is composed.

Draft. A body of soldiers sent on a joint expedition.

Dugout. Underground protection from shell-fire.

Espionage. Practice or employment of spies.

Explosives are compounds or mixture of chemical substances, the atoms of which are capable of rearrangement proceeding of itself when once started. Almost all practical explosives consist of compounds of carbon, hydrogen and sulphur, combined or mixed with sources of oxygen in a concentrated form, such as liquid oxygen, nitrates and nitro-groups.

Black-Powder, technically termed as gunpowder, is a mixture of widely varying composition. Such a mixture develops on explosion, mainly carbon dioxide and nitrogen, together with a little carbon monoxide. The first explosive of this kind was discovered by Pelouze, a Frenchman in 1938, who acted upon cotton with nitric acid, thus preparing *nitro-cellulose* or *gun-cotton*. A drawback to gun-cotton is its extreme inflammability, which is not shared by any other explosives. The explosives of the latter type are not used like gunpowder by setting fire to them; they are 'detonated'; that is used to decompose very suddenly by exploding a small quantity of an auxiliary high explosive which is sensitive to heat or mechanical shock.

In 1847 Sobrero, an Italian, discovered nitro-glycerine formed by acting on glycerine with the mixed acids. This proved much more dangerous and difficult to handle than gun-cotton but nowadays it can be made sufficiently safe to be used as an ingredient in other mixtures, being hardly ever used in its present state. Mr. Noble hit upon the plan of mixing it into a kind of putty with powder as sawdust flour and the siliceous earth known as kieselguhr forming the substance *dynamite*; and later, the gelatinous mixture of nitro-glycerine and gun-cotton which forms the basis of so many explosives today. Smokeless powders are now made of many other compositions as, for example, with addition of nitro-aromatic bodies, such as *trinitrotoluene*, familiarly known as T.N.T.

Evacuation. Removing to a safer place, usually children and old people who are unable to fight.

Field-Marshal. An officer with a rank in Army next above a General. Marshal is the chief officer who regulates the conduct of combats. The word *Marshal* means to arrange in order.

Fifth Column. See Part VI, Constitutional Terms.

Fighters are single or two-seater planes and are meant to harass and drive away or destroy invading air force. They are used both for offensive and defensive purposes. Modern fighter planes usually carry 6 or more machine-guns and some carry quick-firing cannon. Tempest, Fury, Howard and the Spitfire are some of the best fighters in the world today.

Flag. A flag is a piece of cloth of distinctive colour or design usually displayed so as to wave in the wind, meant to convey a definite signal or to give or invite information. Each country has its own national flag; some have additional flags for specific uses.

Flags of all shipping give important information regarding the ship's nationality. They can also convey by standard code of colour, shape and arrangement of flags elaborate messages over quite long distances from pre-wireless days.

In the army, the regimental flags are generally called the 'colours' and of ornate gold-and-tassel decorated silk. Certain universally recognised flags are -the black private flag; the yellow quarantine flag; the red flag of mutiny, the white flag of truce, which displayed to an enemy, invites to parley (to speak with another, especially with an enemy in war) on the understanding that its bearer will be inviolable; the white flag with a red cross flown over hospital ambulance, hospital ships, etc., are, by international agreement, rendered safe from any deliberate attack.

Flag-captain. The captain of the ship which bears the Admiral's flag.

Flag-officer. A naval officer privileged to carry a flag denoting his rank. When he is out on sea in a ship of the fleet, his flag must fly at the mast-head till he remains in it.

Flag Officer Commanding. The supreme commanding naval officer.

Flagship is vessel in a fleet or naval squadron flying the commanding officer's appropriate flag of his rank. This shows the vessel from which orders are issued. In case the flag-ship is put out of action, the squadron commander who is usually an admiral, at once transfers himself and his flag to the next most suitable ship. The flagship among destroyers and other warships is called the "flotilla leader".

Flagstaff. A staff or pole on which a flag is displayed.

Flag, Red. Red Flag is a flag used as a danger signal. The banner of socialism or of revolution.

Flank. The side or wing of an army or fleet. A body of soldiers on the right or left extremities, in battle formation.

Fleet. A division of ships under a single command.

Flight Lieutenant. A rank in air force equivalent to Captain in army and Lieutenant in navy.

Flotilla is a group of submarines or destroyers under one command.

Foray. A sudden raid on an enemy's country.

Garrison. A body of soldiers stationed in a military post, fortress, etc.

Gas Mask. It is a protective device worn over face against effects of noxious fumes, bacteria. Gas mask was developed in World War I for chemical warfare. It is worn in mines, hospitals and by firemen.

General is second in rank to Field-Marshal.

General Headquarters. (G.H.Q.) are the headquarters of Principal Staff Officers, *viz.*, Chief of General Staff (C.G.S.), Adjutant-General (A.G.), Quartermaster-General (Q.M.G.), Master-General of Ordnance, (M.G.O.), Engineer-in-Chief (E.-in-C.), etc., which are situated at a convenient place.

Gestapo was German secret police force.

Glide. See page 307.

Grenade is a hollow iron ball filled with explosives and fired by a lighted fuse. Gunpowder-filled grenades of wood were invented in the sixteenth century. In the 17th century special bands of 'grenadiers' were formed for their use.

It was in 1904 that modern hand-grenades were used by the Japanese against Russia. And various forms, many made from old tin, etc., were introduced at the outbreak of the World War I. 'These first grenades exploded on impact, but the Mill's bomb of which huge numbers were made, depended for its firing upon the freeing of a lever after throwing.

Guerilla Warfare is irregular and unorganised fighting. It aims at hit-and-run policy and avoids open clashes.

Gun is a weapon which discharges a projectile by the expansive force of an explosive generated behind the projectile

in a tube. Technically, they are divided into *small arm* and *ordnance*, or great guns, also called cannon.

Gunboat is a small type of war boat carrying heavy guns. A gunboat is used mainly in rivers and shallow coast waters inaccessible to larger boats.

Gunpowder is usually stated to have been invented by the English alchemist, Roger Bacon, in about 1250. Its earliest recorded military use took place probably about a century thereafter. Gunpowder, although its composition varies considerably, is on the average a mixture of charcoal sulphur and potassium nitrate.

Hand Grenade. A small bomb or missile (with time or percussion fuse) filled with explosive and thrown from the hand, generally in crowds.

Helicopter is a flying machine which rises vertically by means of airscrews and revolves horizontally.

Hilal-i-Jur'at. Please see under 'Military Awards'.

Incendiary. A chemical that destroys material by fire.

Infantry. Stands for soldiers trained and equipped for fighting on foot. Since the beginning of organised warfare the infantry has been the most important and effective branch of the army. The infantry is organized into brigades, regiments, battalions, companies, platoons and squads.

Knapsack. A bag containing necessary articles which a soldier carries with him.

Lancers are cavalry regiments carrying light lances from 8 to 11 feet in length. The lance was the chief weapon of offence in the age of chivalry. But with the introduction of firearms it declined in importance.

Launch. The largest, generally flat-bottomed, self-propelled boat carried by a man-of-war. It is put out on the sea as and when necessary.

Lewis Gun is a gas-operated light machine-gun. Like all machine guns, it is automatic and balanced on a rest at the front end. Lewis gun is worked by diverting the gas through a hole in the barrel into a cylinder, whose piston extracts and ejects the fired round, and brings up a new round for insertion

by the action of a spring. It weighs 28 pounds and has a 47-round magazine. A light model weighing 18½ pounds is used by aircraft.

Lieutenant-Colonel is second in command.

Lieutenant-General is the commander of a Division.

Luftwaffe was official name for the German Air Force.

Machine Gun is a firearm, a small-arm gun. It has a mechanism, of loading and firing, operated by the recoil or discharge or by the explosion of gas. It discharges rifle bullets or small shells very rapidly.

Magazine is a place where ammunition, arms and other war materials are stored.

Man-of-war. A warship, which can take part in naval warfare.

Major. An army officer in rank between a Captain and Lieutenant-Colonel.

Major-General. An officer in the army next above Brigadier and next below Lieutenant-General.

Manoeuvre. A skilful and clever movement in military or naval tactics. The idea is to get out of a difficult situation or to put enemy on the wrong track.

Master-General of Ordnance looks to the manufacture and supply of arms, ammunition, etc.

Mechanized Units now consist of Armoured Corps, Motorised Units, Artillery Units Anti-Tank Artillery Units, Anti-Aircraft Artillery, Coastal Defence Artillery, Sappers, Miners, etc.

Military Awards in Pakistan

Military awards have two categories—operational and non-operational. Operational awards are conferred for acts of valour and courage performed in the face of the enemy. Non-operational awards are given for similar acts but not on active operations.

Allowances attached to operational awards are tenable or three lines, *i.e.*, to the recipients and their heirs. These

are reducible by 25 per cent on each succession in such a way that the third generation gets 50 per cent of the original amount.

In addition to monthly monetary allowances, the recipients of operational and non-operational gallantry awards are entitled to have a lump sum cash reward or a land grant, whichever is opted. The cash reward which is payable by the Central Government ranges from Rs. 3,000 for Tamgha-i-Basalat to Rs. 10,000 for Nishan-i-Haider, and land grant which is allotted by Provincial Governments ranges from half a square for Tamgha-i-Basalat and three squares for Nishan-i-Haider.

Operational Awards

Operational awards consist of Nishan-i-Haider, Hilal-i-Jur'at, Sitara-i-Jur'at and Tamgha-i-Jur'at.

Nishan-i-Haider. The Nishan-i-Haider is the highest award and takes precedence over all civil, military and Police awards. It is awarded to members of the Armed Forces who perform an act of greatest heroism or of the most conspicuous courage in circumstances of extreme danger and have shown bravery of the highest order or devotion to 'duty' in the presence of the enemy on land, at sea or in the air.

The insignia of this award consists of a five-pointed star made of gun metal with white-enamelled and cupro-nickel metal designs. The ribbon is one and a half inch wide green watered silk. When worn alone, a miniature replica of the star is attached to the ribbon. The recipients of this award have the privilege of adding letters N. H. after their names.

Nishan-i-Haider is equivalent to Victoria Cross in the British Army.

The first Nishan-i-Haider. Only three persons have won the Nishan-i-Haider and all three sacrificed their lives in attaining this highest distinction. All three were infantrymen and all three belonged to the famous Punjab Regiment of the Pakistan Army. The first to win Nishan-i-Haider was Capt. Mohammad Sarwar of village Sanghori, Tehsil Gujar Khan, Distt. Rawalpindi. He won his Nishan-i-Haider for act of greatest heroism in the Kashmir Operations in 1948. The second N. H. went to Maj. Mohammad Tufail of Chak

253-EB, Tehsil Pakpattan, Distt. Montgomery, who laid down his life leading his men against an Indian force which had sneaked into occupy a part of our territory on the East Pakistan Border. In the recent Indo-Pakistan War this highest gallantry award was won by Maj. Raja Aziz Bhatti of village Ladian, Tehsil Kharian, Distt. Gujrat. It was Aziz Bhatti who was the anchor-sheet of the small force which defied Indian onslaughts for days and frustrated all their desperate efforts to cross BRB canal and make a dash for Lahore.

Nishan-i-Haider can be won by any member of the Armed Forces regardless of his rank. Nishan-i-Haider winners, other than officers, receive Rs. 50 per month, and NCOs and other ranks Rs. 25 per month.

Hilal-i-Jur'at. The Hilal-i-Jur'at is admissible to officers only. It is awarded for acts of valour, courage or devotion to duty performed on land, at sea, or in the air in the face of the enemy. The recipients of this award have the privilege of adding the letters H. J. after their names.

The insignia of this award comprises a gold medal with the inscription "Hilal-i-Jur'at" in Arabic script on its bar. The ribbon is one and a quarter inch wide watered silk with red, green and red stripes in equal proportions.

Sitara-i-Jur'at. Sitara-i-Jur'at is conferrable on officers Junior Commissioned Officers and Warrant Officers of all the three Services for gallantry and distinguished service in combat. The insignia of the Sitara-i-Jur'at is a silver medal with its name inscribed in Arabic letters on its bar. The ribbon of the medal is one and a quarter inch watered silk with white green and white stripes in equal proportions. Its equivalent in the British army is the Military Cross (MC). Those awarded this medal have the privilege of adding S.J. after their names. This award carries a monthly allowance of Rs. 30 per month admissible to Junior Commissioned Officers and Warrant Officers only.

Tamgha-i-Jur'at. Tamgha-i-Jur'at is conferred on Non-commissioned Officers and other ranks for gallantry and distinguished service in the face of the enemy on land, at sea or in the air. The insignia of Tamgha-i-Jur'at comprises a bronze medal. Its ribbon is one and a quarter inch wide watered silk with white, green red and white stripes. The Tamgha-i-

Jur'at is equivalent to the Military Medal (MM) in the British Army. Those who win the Tamgha-i-Jur'at receive an allowance of Rs. 15 per month.

Tamgha-i-Difa'a. There is one more medal which indicates operational service. This is the Tamgh-i-Difa'a. This medal is conferrable on members of the armed forces who take part in minor operations or campaigns within the qualifying dates and prescribed areas of operations. The President may institute and create a separate clasp to the Tamgha-i-Difa'a for each minor operation or campaign. This clasp shall bear the inscription of that particular operation or campaign.

The insignia of the Tamgha is a cupro-nickel medal with the words "Khidmat-i-Pakistan" inscribed in Urdu on the medal.

Sitara-i-Basalat. The insignia of Sitara-i- Basalat is a seven-pointed star with a budding narcissus flower placed in an ornamental vase at each point. In the centre of the star is placed a medal lion bearing the emblem of Hilal and Sitara in waxing position. The star hangs from an ornamental clasp bearing the inscription "Sitara-i-Basalat" in Arabic script. The ribbon is one and a quarter inch wide watered silk with stripes of dark blue, red light blue, red dark blue.

The Sitara-i-Basalat and Tamgha-i-Basalat are admissible for acts of valour, courage and devotion to duty not on active operations against the enemy to officers, JCOs, Warrant Officers, NCOs and ORs.

The insignia of the Tamgha-i-Basalat is a bronze medal with the words "Tamgha-i-Basalat" inscribed on it. Its ribbon is one and a quarter inch wide watered silk with stripes of light blue, red, dark blue, red and light blue.

The winners of Sitara-i-Basalat and Tamgha-i-Basalat have the privilege of adding T.I.B. (I) and T.I.B. (II) respectively after their names.

In addition to members of the Army, Navy and Air Force, gallantry awards, both operational and non-operational are also admissible to members of the civil armed forces when serving under the Central Government.

If a recipient of an award performs an act of gallanryt

or distinguished service worthy of the same award, he is awarded a bar to that award. In the recent war, only one officer, Sq./Ldr. Alam of the Air Force, won a bar to his Sitara-i-Jur'at.

NON-OPERATIONAL AWARDS

Order of Basalat. Among non-operational awards the order of Basalat is for bravery but not on active operations against the enemy. This order has two classes—the Sitara-i-Basalat and the Tamgha-i-Basalat.

Tamgha-i-Khidmat is awardable to Junior Commissioned Officers and Warrant Officers of the Army, the Frontier Corps and Frontier constabulary when serving under the Central Government, Chief Petty Officers of the Navy and Warrant Officers and the Flight Sergeants of the Air Force as well as Non-commissioned officers, Other Ranks and Non-combatants of the Army or equivalent ranks of the Navy and Air Force and the Frontier corps and the Frontier constabulary who have rendered long meritorious or distinguished service of a non-operational nature.

Military Law is a code of rules governing the conduct of persons in military service, defining their rights, duties and obligations. Chiefly statutory, it deals with the maintenance of discipline, creates military tribunals and prescribes penalties for military offenders. In time of emergency or war, martial or military law supersedes civil law.

Miners. Soldiers who lay mines.

Mines. See submarine mines.

Mine-laying Planes lay out mines in enemy waters which otherwise cannot be approached.

Mine, Military is an explosive charge, set in a strategic position exploded by remote control. In ancient warfare, mines were tunnels driven under fortifications by attackers. The object was to gain entrance or to undermine walls. Land mines are now buried in the ground as a defence against the approach of tanks. They are exploded either by hostile troops or vehicles passing over them; or electrically from a distance.

Mobilisation. Preparation of military forces for service in war.

Morale. Mental state in the face of an enemy or trying circumstances.

Mortar. A short and very thick piece of artillery of large calibre firing a heavy shell at a fixed angle of 45° or thereabout.

Munition. Materials used in war. Military stores.

Musket is a small infantry firearm. It has succeeded to the 16th century arquebus (a hand-gun). An early type was fired by a matchlock, then successively by wheel lock, flintlock and percussion cap.

Nishan-i-Haider. Please see under 'Military Awards'.

Non-Aggression Pact is an agreement between two or more countries which undertake to abstain from the use of force against each other and settle any differences by peaceful means.

Non-Commissioned Officers are those who command their men by virtue of the power given to them by the officer commanding their unit.

Ogpu. Soviet Secret Service.

Open City is one which contains no military objects.

Operations Map. A map used in planning military operations.

Ordnance is a term which refers to large mounted guns, or cannons, their equipment, ammunition. Sometimes the term is used to embrace pistols, rifles and all weapons of offence and defence in army and navy.

Parachute is an apparatus made of silk and shaped like an umbrella. It is designed to break the fall of bodies from great heights. A parachute is over 20 feet in diameter. To its edge are fastened at regular intervals a number of ropes knotted together at the ends and fastened to a single rope by which the body is suspended.

At first parachutes were used merely for descent from balloons at shows and exhibitions. But now they have come to be used for landing of paratroops. During war, paratroops descend behind the enemy with the help of parachutes. A parachute is of the utmost value in saving the lives of airmen.

The importance of parachutes in this respect has led to the invention of many improvements in structural details.

Attempts are being made to replace parachutes by wings. A French army parachutist, Sergeant-Major Leo Valentin, holder of world record for parachute jumping, had been at work on the wing. He was confident that he would be able to fly with a pair of wings constructed out of whale bone and bits of canvas. He claimed that by spreading his wings he would be able to slow down his falling speed to between 60 and 70 miles per hour.

Passing out Parade is a parade which is conducted when fitness certificates are granted to the personnel on their completing prescribed training period.

Patrol is going round in a camp or garrison to watch and protect. A small body of soldiers is sent out occasionally to find out the enemy positions, their weak as well as strong points. The information is necessary for military purposes.

Periscope is an optical instrument used in trench warfare and in submarines: enables an observer to see surrounding objects from a lower level. Details have already been given.

Picket. A small outpost or guard station in front of an enemy at a critical point.

Pioneer. A party of soldiers which goes ahead and the main army clears the road of any obstructions and thus prepares the way for an advance.

Pip is mark on a military officer's sleeve to indicate his ank.

Pistol is a short firearm with stock to fit the hand and hort barrel or barrels. It was invented at the beginning of he 16th century. The successive stages of its development were: the wheel-lock, the 17th century flintlock, in 1836 the percussion cap rifled single-barrelled pistol. In 1839 came the Colt's revolving single -barrelled pistol. This pistol was commonly called a revolver. It was the first successful repeating weapon. The automatic pistol came to be used late in the 19th century.

Platoon is a military unit consisting of half a company commanded by a Lieutenant.

Principles of Warfare. Fundamental principles in the conduct of war are morale, co-operation, economy of force, simplicity, security, offensive, surprise, etc.

Projectile. *Projectile* is to throw out or forward. Projectile is the body which projected by exterior, continues to move by its own inertia. It is equally true of caveman's stone and the modern shell and torpedo. Hand projectile includes the knife, spear boomerang and hand grenade. In modern use the term is more commonly confined to ammunition of large guns.

Quartermaster is an officer who looks after the quarters of the soldiers and attends to the supplies. He is assisted by Quartermaster-Sergeant, a non-commissioned officer.

Quartermaster-General. A staff-officer of high rank (Major-General or Colonel) who deals with all questions of transport, marches, quarters, fuel, clothing etc.

Quisling. See Part VI on Constitutional Terms.

Rear Admiral. A naval officer who commands the rear division of a fleet.

Rear-guards. Troops which protect the back or rear of an army from any surprise attack by the enemy.

Reconnissance. A survey or examination of a tract of (enemy) country to find out enemy position with a view to adopting military operations.

Reconnoitre. To examine enemy positions by getting as near as possible, with a view to opening military operations.

Reconnaissance Planes are rather slow planes. They carry photographic equipment and light bombs. They take photographs of military objects and watch enemy movements from the air.

Recruit. To enlist new soldiers; to obtain fresh supplies.

Red Cross is the general name for a group of societies established in all civilized countries for the alleviation of distress in times of both war and peace. It was first conceived

by Jean Henri Dunat. He wrote *Un Souvenir de Solerino*, describing the sufferings of wounded soldiers, showing the urgent need for organised relief. It resulted in an international conference at Geneva in 1804. It led to the adoption of measures insuring neutrality to International Red Cross.

Regiment (*dastah*) is a body of soldiers under the command of a Colonel.

Revolver is a pistol of which revolving cylinder of chambers allows five to seven shots to be fired before reloading. The successive stages of its development were muzzle loading, breech loading, self-ejecting. The latest development is the modern automatic pistol.

Rifle is a firearm. It has upon the surface of its bore spiral grooves called rifling. A rifle may be of any size, but the word usually refers to small arms fired from the shoulder. The rifling which gives rotary motion of the bullet insures long range and greater accuracy of fire. The discovery of the principle of rifling was made in about 1500. The introduction of the magazine which made for greater rapidity of firing was a great advancement. In 1840, Colt in America invented the repeating rifle, after which came the Henry and Spencer's beech loading rifles in 1860. The automatic and semi-automatic rifles followed the development of the repeating and magazine rifles.

Rocket (*baan hawai; agni baan*) is a projectile in a cylinderical paper casing that is impelled by a force within itself. Inside is an inflammable material that is set on fire to produce a recoil that will send the rocket in the air. Rockets are used as signals in the army and navy and as a means of shooting life-saving ropes to ships in distress. They were once used as incendiaries in warfare.

The development of the military rocket by Germany was the result of many experiments undertaken in that country, although the Chinese used this means to propel arrows ten centuries earlier. Congreve rockets were used during the struggle against Napoleon in 1806.

Scientists are building and experimenting with rockets.

Dr. Robert Hutchings Goddard, a foremost American rocket experimenter, designed rockets which shot up vertically more than a mile and attained maximum speed of 700 miles an hour. It is claimed by scientists that it is possible in theory to build a threestep rocket (three mechanisms firing one after the other), which would go up nearly 1,000 miles reaching a top-speed of 11,000 m.p.h., which at that height would be enough to clear the rocket of earth's gravitational pull, and keep it moving onward in space. From the standpoint of science, rocket offers the only possibility of sending instruments to altitudes above those reached by sounding balloons. The scientific world has begun to think of pointing rockets towards planets. From the standpoint of commerce man can look to the rocket to attain speeds of transport above some hundred miles an hour. From the standpoint of war, rockets can carry explosives faster than aeroplane and farther than a projectile.

Projectiles were one of the most powerful of Hitler's secret weapons. They were used for offensive purposes against England in 1944. Falling from a great height and at a speed faster than sound, so that the noise of their descent was not heard until the explosion had taken place, no air-raid warning was possible. They caused many casualties and did extensive damage. It was found that the Germans had guns for firing V-3 rocket shells heavily protected by concrete 18 feet thick and placed 400 feet below the ground.

Sappers (*L. sapa*, a pick). Those who sap or destroy by digging underneath. *Sappers and Miners* are ordinary mechanics in the engineering wing of the army who destroy mines and lay mines.

Scout. One who is specially trained in observing the enemy and reporting the results of observation.

Seaplane is an aeroplane fitted with float to enable it to fly from and alight on sea.

Semaphore is a device for conveying signals, consisting of a mast with arms turned on pivots by means of cords of levers.

Sergeant. A non-commissioned officer of the army

and marines next above a corporal. He organises regular drills for the troops, overseers, the soldiers in barracks and assists the officers in all ways in the field. At times he is required to command a small body of troops.

Sergeant-Major. The highest non-commissioned officer, employed to assist the Adjutant.

Shells are projectiles fired from artillery weapons. Henry Shrapnel (1761-1842) was the inventor of one, and this consisted of a steel case containing a number of bullets and a small bursting charge.

Shots are solid projectiles fired from guns. Stone shots were used in the time of Henry V and it was only after a long time that steel shots were invented by Sir Joseph Whitworth.

Signal Communications. System. In this system of communications all communications pass through one centre. The means of communications are (*i*) Messengers (motor-cycles, pigeons, dogs, horses, aircraft, etc. (*ii*) Radio, (*iii*) Panel for signal to aircraft (*iv*) Visual system such as flags, lamps, etc. and (*v*) Telephone and telegraph.

Sitara-i-Jur'at. Please see 'Military Awards'.

Skirmish is an irregular fight between two small parties of opposing armies.

Smoke Screen. The employment of smoke screens in warfare has come to be of considerable tactical importance. Land forces may utilise smoke screens for the purpose of making an advance or a retreat. In previous wars black smoke from the funnels of ships was occasionally used to provide a cover for escape purposes. But it has since been realised that white smoke offers much better protection than black smoke. All modern screens are of white smoke. Phosphorus was the principal smoke-producing substance. The smoke may be produced by the burning of special smoke candles, by special handgrenades filled with a smoke charge, and various other methods.

Snipe is to pick off by rifle from (usually distant) cover.

Squad. A number of soldiers organised for drill.

Squadron. An Air Force unit with same type of aircraft.

Staff College is a college where military officers are trained in higher branches of professional knowledge, staff duties and higher command.

Station Commander is responsible for training administration, discipline and command of forces located at a station.

Strategy is the act of directing troops, etc., it was the conception of the general plan of a campaign and movements of forces relating to the theatre of war.

Submarine Mines are explosive machnes fixed below the surface of the sea for the destruction of enemy vessel, in war-time. They are distinguished from torpedoes in that the torpedoes are fired from tubes mounted in ship. The mines are made by filling hollow steel cases with the high explosive and are moored (anchored) to the sea-bed by cables. Mines contain trinitro-touene (T. N. T.) or other high explosives, and are adjusted to float at a constant depth. The charges may be fired either by the closing of an electric current and the ignition of fulminate or mercury, or by a striker hit by the oncoming vessel. They are cleared by two mine-sweepers with a cable between them, which breaks their moorings and, allows them to rise to the surface. Controlled mines are laid on the bed-sea and connected to a shore station, from which they are electrically exploded when an enemy craft is known in the area. Their advantage is that they can be rendered harmless, for the passage of non-hostile vessels.

Depth-charges are mines dropped or fired at a depth of some 50 ft. They are used with deadly effect against submarines. The *pravane* is a mine-sweeping device. It was invented by Burney during the World War I. It is a torpedo-shaped steel body carrying a rudder which keeps it at a certain depth. It is pulled along by a wire hawser attached to the keel of the ship as far forward as possible. A suitable vertical rudder causes the pravane to steer off from the ship until its rope is at a certain angle. This rope gets hold of mooring rope of any mine it comes across. As the ship moves forward, the

moving rope reaches the pravane. This is provided with sharp teeth which cuts apart the mooring rope. Then, naturally the mine comes to the surface where it can be seen and destroyed.

Surprise. A sudden attack which takes the enemy unawares.

Tactics. The science or art of manoeuvring military and naval forces in the preparation for and during war.

Tank was the purposely misleading name given to the armoured bullet-proof vehicles moving on caterpillar tracks which the British introduced in the battle of Somme in 1916. It is a strongly armoured military motor vehicle equipped with quick firing machine-guns. It can traverse open country and natural obstacles. A tank is propelled by internal combustion engines. Tanks are used in war to cross the shell-pitted 'no-man's land' in the face of heavy machine-gun fire. They break down resistance to the assaulting infantry. At the initial stages of development, a tank could move at a low speed but now they run at a fairly high speed. Development in the last World War called for mass production of medium and heavy tanks.

Tattoo. A beat of drum and a bugle-call to all soldiers to quarters. A military entertainment at a feast.

Tear Gas is a gas which when released causes tears to flow from eyes. Police uses it for dispersing crowds or making arrests.

Tamgha-i-Khidmat.
Tamgha-i-Basalat.
Tamgha-i-Diffa.
Tamgha-i-Jur'at.

} Please see under Military Awards.

Territorial Waters. See Part VI—Constitutional Terms.

Time-fuse is a fuse set to function at a required time.

Tommy Gun is a self-loading gun. It got its name from the U.S. inventor, T. Thomson.

Torpedo is a self-moving submarine mine including a large explosive change in its head. It explodes underwater with terrific force by contact. Originally, any marine explosive machine was termed as torpedo. Now only those propelled by their own power are called torpedoes. In 1805, Robert Fulton first experimented with methods of exploding charges under the hull of a vessel. The first practical result was the spar torpedo, which was fixed to the end of a pole and taken to the ship by a boat or submarine. It was fired electrically on touching the hull. This type was much used in the American Civil War.

The modern torpedo is cigar-shaped, 21 inches in diameter and about 21 feet long with six compartments. The warhead is an attached shell containing 500 lbs. of T.N.T. It is fired by the action of a pistol screwed into the nose. Then comes the air-vessel, containing air at a pressure of 2,500 lbs. per square inch. In the balance chamber are vessels of fuel and water and a generator which burns the fuel with the air and generates the motive steam. The gyroscope is set next to the engine. It ensures the accurate course of the torpedo. The buoyancy chamber, occupying the rear end, is traversed by two tubes carrying the propeller-shaft and the automatic horizontal rudder control. In the tail are the horizonal and vertical rudders and the opposite gearing of the two four-bladed propellers. The torpedo is projected by an explosion of cordite (an approved smokeless gunpowder so called from its cord-like appearance) from a tube in the side of a destroyer or submarine.

Torpedo Boat is a small, war vessel capable of high speed and designed for discharging torpedoes at enemy ships. The earliest type was built in 1875. In modern warfare it has been superseded by the Destroyer.

Transport Planes carry light tanks and equipments of all kinds, including mules, etc.

Trench (*khandaq*) is an excavation to prevent enemy's fire reaching the soldiers.

Troop-carrying Planes are big-sized planes. They are used for carrying troops, rations, etc.

U-Boat. German submarine.

Victoria Cross was the highest British decoration for valour.

Warrant Officer is one who commands by virtue of a formal document. In rank he is between Commissioned officers and Non-Commissioned officers.

Warship is a vessel built and equipped for fighting purposes. Warships are classified into battleships, cruisers, destroyers, coastal defence gunboats, aircraft-carriers, submarines.

Corresponding Commissioned Ranks in Pakistan Forces

S. No.	*Pak. Army*	*Pak. Air Force*	*Pak. Navy*
1.	2nd Lieutenant	Pilot Officer	Midshipman Cadet (but junior to Army and Air Force ranks)
2.	Lieutenant	Flying Officer	Sub-Lieutenant Acting Sub-Lieutenant (but junior to Army and Air Force Ranks)
3.	Captain	Flight Lieutenant	Lieutenant
4.	Major	Squadron Leader	Lieut.-Commander
5.	Lieut.-Colonel	Wing Commander	Commander
6.	Colonel	Group Captain	Captain
7.	Brigadier	Air Commodore	Commodore (1st and 2nd class)
8.	Major-General	Air Vice-Marshal	Rear-Admiral
9.	Lieutenant-General	Air Marshal	Vice-Admiral
10.	General	Air Chief Marshal	Admiral
11.	Field-Marshal	Marshal of the Air Force	Admiral of the Fleet

Corresponding Non-Commissioned Ranks in Pakistan Forces

S. No.	*Pak. Army*	*Pak. Air Force*	*Pak. Navy*
1.	Acting Lance Daffadar/Lance Naik and Sowar/	Leading Aircraftsman	Able Seaman
	Sepoy	Aircraftsman	Ordinary Seaman
	(Acting Lance Daffadar/Lance Naik is senior to Naval and Air Force Ranks)		
2.	Lance Daffadar/ Naik	Corporal	Leading Seaman
3.	Squadron/Battery/ Company Daffadar/ Havildar Major Quartermaster Daffadar/Havildar, Havildar	Sergeant	Petty Officer
4.	Warrant Officer Class II Regimental/ Battalion Daffadar/ Havildar Major Quartermaster Daffadar/Havildar	Flight Sergeant Patty Officer	Chief Petty Officer
5.	Warrant Officer Class I	Warrant Officer	No equivalent
6.	Jemadar	No equivalent	No equivalent
7.	Subedar	No equivalent	No equivalent
8.	Subedar Major	No equivalent	No equivalent

EXAMINATION QUESTIONS

WITH BRIEF SOLUTIONS

1. *Why does a regiment break step when crossing a bridge?*

In case the step is not broken the period of step corresponds with natural period to vibration of the bridge which adds to this vibration, endangering the stability of the bridge which may collapse.

2. *How do ships indicate when they are in distress and need help?*

(*a*) The "SOS" signal is sent out if the vessel is fitted with a wireless installation; or (*b*) a gun is fired at intervals of a minute; or (*c*) the international code signal of distress (flag N.C.) is hoisted.

At night in addition to (*a*) and (*b*) above, a barrel of oil or any inflammable material is lighted on the ship, and rockets are sent up at a time at short intervals.

3. *It is almost very often, in time of war, that ships and armies put up a "smoke-screen." What creature of the sea suggested this idea?*

The cuttle-fish is provided with a bag which stores up an ink fluid. When in danger of attack, it squirts this out and shelters itself. This fluid is used in making the pigment sepia largely used by water-colour artists.

4. *What is guerrilla warfare and why is it so called? Has it anything to do with gorillas?*

Guerrilla (or guerilla) warfare is carried on by small bodies of irregular troops, acting independently. *Guerrilla* is a Spanish word. It is the diminutive of *guerrilla* meaning war. It has no concern with gorilla, an African ape.

5. *What is a Naik and what is a Risaldar?*

A Naik is an N.C.O. in the army. A Risaldar is a cavalry officer (Captain).

6. *Why is a German submarine called a U-boat?*

The German word for submarine is *Unterseeboot* (Under-seaboat) and the U is taken from the first letter of this word.

7. *What is the highest rank in the P.A.F?*

Marshal of the Pakistan Air Force.

8. *What is the difference between* (*i*) *a gun and a rifle,* (*ii*) *an automatic pistol and a revolver?*

(*i*) A rifle differs from a gun in so far as it has the barrel spirally grooved to give greater accuracy in firing; (*ii*) a revolver is a pistol having a revolving cylinder containing a number of chambers for cartridges, which are fired in turn by a one-lock mechanism.

9. *Write brief notes on:—*

Aircraft Carrier; Armoury; Artillery; Atom Bomb; Camouflage; Cruiser; Destroyer; Explosives; Flag; Grenade; Parachute; Red Cross; Rocket; Smoke Screen; Submarine Mine; Tank; Torpedo.

10. *What do you understand by:—*

Aero Bomb; Air Gun; A. R. P.; Battalion; Battery; Black out; Bren Gun; Brigade; Dive Bomber; Fifth Column; Flotilla; Gas Mask; Machine Gun; Mine; Military Law; Ordnance; Pistol; Platoon; Projectile; Reconnaissance Plane; Shells, Tear Gas; Trench?

11. *Explain the following terms:—*

Blitzkreig; Blockade; Convoy; Court-Martial; Zero Hour.

12. *Why is a man without a parachute killed when he jumps from an aeroplane, while a man who falls with an open parachute remains uninjured?*

13. *Why must a parachute have a hole?*

14. *What is a land mine?*

15. *What do the following flags signify:* (*a*) *a white flag,* (*b*) *a black flag?*

16. *What are Commissioned ranks in Pakistani Forces?*

17. *What is the original meaning of the word "cadet" and what is its derivative?*

18. *What are the Naval Air Force equivalent ranks to* (*a*) *a general,* (*b*) *a major?*

N.B.—For answers to questions from 9 to 18 please consult the chapter.

PART IX

SPORTS, GAMES, Etc.

SPORTS, GAMES, ETC.

1. GENERAL

Sport: (Verb): to play, to frolic, to practise field diversions, to trifle, to amuse, to make merry, to represent playfully, to spend in sport or display.

(Noun): That which amuses or makes merry, play, mirth, jest, anything for playing with, a toy, field diversion.

Sportsman: One who practises, or one skilled in field-sports. *Sportsmanship:* practice or skill of sportsman.

The field of sports, games and pastime is very vast. There are outdoor games and indoor games. There are sports in which competitors depend upon mechanical aid in addition to their own skill, *e.g.*, aeroplane, racing, motor racing, motor-boat racing, motor-cycle racing, greyhound racing, horse-racing, etc. They have not been included here so as to restrict our range to those sports which relate purely to human physique.

2. Measurements and Number of Players

Badminton Court: 44 feet × 20 feet (Doubles).
44 feet × 17 feet (Singles).
Players: 2 (on each side).

Baseball: Diagonal-shaped ground: 90 feet distance between each base and 127 feet along the diagonals.
Players: 9 (on each side).

Boxing Ring: 12 feet to 20 feet square.

Basketball: 85 feet × 46 feet (maximum dimensions).
Players: 5 (on each side).

Cricket:

Ground: Round or oval-shaped.

Wickets: 22 yards apart.

Ball: 8-13/16 inches to 9 inches in circumference and 5½ to 5¾ oz. in weight.

Bat: 4¼ inches maximum width and 38 inches maximum length.

Bowling Crease: 8 feet and 8 inches in length.

Popping Crease: 4 feet from the wicket and deemed unlimited in length.

Stumps: 27 inches out of the ground.

Players: 11 (on each side).

Croquet:

35 yards × 28 yards.

Players: 1 or 2 (on each side).

Derby Course: 1½ miles.

Football Field: (Association)

Length: 100 yards to 130 yards.

Breadth: 50 yards to 100 yards.

Goal: width 8 yards, bar 8 feet from ground; area 6 yards from each goal-post.

Ball: 27 inches to 28 inches in circumference.

Duration: 90 minutes (maximum).

Players: 11 (on each side).

Football, Rugby:

Field: 100 yards × 75 yards.

Goal-posts: 11 feet in height and 18 feet 6 inches apart, joined by a cross-bar 10 feet from ground.

Players; 13 or 15 (on each side).

Golf

Hole: 4¼ inches in diameter.

Ball: 1½ inches in weight.

Hockey:	*Ground:* 100 yards by 55 to 60 yards;
	Goal: Perpendicular posts 4 yards apart, joined together by a horizontal cross-bar 7 feet from ground.
	Ball: $8^{13}/_{16}$ inches to $9\frac{1}{4}$ inches circumference; weight: $5\frac{1}{2}$ to $5\frac{3}{4}$ oz.
	Duration of Game: Two periods of 30 minutes each plus extra time in case of draw or suspension of game for some reason.
	Players: 11 (on each side).
Marathon Race:	26 miles × 885 yards.
Pingpong: (Table Tennis)	9 feet × 5 feet × $2\frac{1}{2}$ feet above floor.
Polo	*Ground:* 300 yards × 160 yards (if boarded).
	300 yards × 200 yards (if unboarded)
	Ball: $3\frac{1}{2}$ inches in diameter and $5\frac{1}{2}$ oz. in weight.
	Goals: 250 yards apart and 8 yards wide; goal-posts: 10 feet in height; goal-board: 11 inches in height.
	Duration: Seven periods of 8 minutes each. Intervals: 3 minutes each.
	Players: 4 (on each side).
Polo (Water):	*Ball:* 27 inches to 28 inches in circumference.
	Goals: Distance between goals: 19 yards to 30 yards;
	Width: 20 yards;
	Depth: Water not to be shallower than 3 feet;

	Width of Goals 10 feet wide; Cross-bar: 8 feet from bottom.
	Players: Each team 7 players.
	Duration: 14 minutes.
Rackets: (Squash)	*Court:* 32 feet × 21 feet: height of front wall 18 feet, height of back wall 7 feet. *Service Box* (inside): 5 feet 3 inches.
	Racket: 27 inches in length. Shuttle-cock: $\frac{1}{4}$ oz. in weight.
Racket:	*Court:* 62 feet × 31 feet.
Tennis (Lawn):	*Court:* 78 feet × 36 feet (Doubles).
	Height of net: 3 feet at centre.
Tennis (Table):	*Court:* 9 feet ×5 × $2\frac{1}{2}$ feet above floor.
	Net: 6 feet long and $6\frac{3}{4}$ inches in height from the surface of the table.
	Players: 1 or 2 (on each side).
Throwball:	*Court:* For college students: 60 feet × 40 feet.
	For girls: 50 feet×30 feet.
	Net: For girls; 6 feet high;
	For college students: 7 feet high.
Volleyball:	*Court:* 60 feet × 30 feet.
	Ball: 26 inches to 27 inches in circumference.
	Net: Minimum height: 7 feet.
	Players: 6 (on each side).
Wrestling:	*Mat:* 6m × 6m and 10 cm thick.

3. TROPHIES

Agha Khan Cup	Football.
America Cup	Yacht Racing.
Ashes, the	Cricket (Australia and England).
Beighton Cup	Hockey (India).
Colombo Cup	Football.
Corbillon Cup	World Table Tennis (Women).
Davis Cup	Lawn Tennis.
Derby	Horse Racing.
Durand Cup	Football (India).
F. A. Cup	Football (India).
Grand National	Horse Steeple-Chase Race (England).
I. F. A. Shield	Football (India).
King's Cup	Air Races.
Prince of Wales Cup	Golf.
Rohinton Baria Trophy	Cricket (Inter-University).
Ryder Cup	Golf.
Rovers Cup	Football (India & Pakistan).
Schneider Cup	Seaplane Race (U.K.)
Swaythling Cup	World Table Tennis (Men).
Thomas Cup	Badminton.
Walker Cup	Golf.
Wrightman Cup	Lawn Tennis (Women of U.S.A. and England).
Westchester Cup	Polo.

4. SPORTSWISE TERMS

Billiard	Baulk or Balk; break; cue; jigger; pot.
Bridge	Little Slam; revoke; ruff; vulnerable.

Cricket: The ashes; bails; bowling; body-line bowling; break; bump; bye; cow-shot; cover point; crease (popping crease) drive; googly; a duck; grub; gully; hat-trick; hit wicket; hook; innings; kicker; knock; L.B.W.; leg break; lob; maiden over; no-ball; on-side; out-field; over-throw; play; racquet; the rubber; silly point; skilled out; sneak; spoon; stone-walling; stumps; swip; tip tip and run; wide ball.

Football: Back; centre forward; collar; corner-kick; dribble; drop-kick; full-back; free kick; hat-trick; in-pass; off-side; penalty-kick; place-kick; punt; throw-in.

Golf: Baffy; bogy; borrow; caddie; cannon; cleek; divot; fair-way; gobble; hole; links; mashie; put; stymie; tee.

Hockey: Back; bully off; carry; centre forward; dribble; full-back; hat-trick; in-pass; off-side; penalty; roll-in; scoop; sticks; striking circle; under-cutting.

Polo: Chukker; bunker.

Tennis: Backhand drive; deuce; half-volley; hat-trick; kill; lob; let; service; smash; volley; fault.

Miscellaneous Bisque (Croquet); hoop; huffs; jack; king-pin; love; mallet; outfighting; pawn; pitcher; quoits; stalemate.

5. TERMS

All-Rounder. A player who is equally efficient in a number of games, or in all spheres of a game.

America Cup. Trophy or prize for international yacht (a vessel, elegantly fitted for pleasure-trips or racing) race. Competition for yacht race is open to all countries of the world. The trophy was offered in 1851 by the Royal Yacht Squadron of Britain. The first competition held at Cowes, Isle of Wight, was won by America. Since then it is being staged in American waters.

Amphitheatre. (Greek: *amphi*, round about, *theatron*: a place for seeing—*theaomai*, to see) an oval or round-shaped, or circular edifice having rows of seats one above another around an open space, called the arena, in which public spectacles are exhibited. Originally it meant roofless Roman building, like a stadium, for accommodating vast crowds to see gladiators, bull-fights etc. Arena in centre, walled with gradually rising seats, built elliptically. Colosseum at Rome, seating 50,000, displays most ingenious architecture of ancient times. Now the term means areas or stadiums which are reserved to stage games and sports.

Ashes, The (Cricket). A mythical trophy (being the ashes of the wickets and ball used in the first series of matches played in 1880 between England and Australia). Australia won the rubber and took away the *ashes*. Since then English and Australian cricket teams compete every two years alternately in Australia and England.

Athlete. (Greek: *athletes—athlos:* contest). A person who participates in physical exercises or competes in games which require physical strength.

Athletics. (Greek: *athletes—athlos:* contest): The art of wrestling, running, walking, jumping and throwing etc. athletic sports. The term refers broadly to all sports and games which depend on feats (French, *faith*; Latin, *Factum-Facere:* to do; means a deed manifesting extraordinary strength, skill or courage) of physical strength and skill; also refers to exercises which develop muscles and physical strength. There are two branches of modern althletics, indoor and outdoor.

The history of athletic starts in the days of pre-history, or of mythology. We have details of olympic games of 776 B. C. It is certain that the games were being held long before this. They were being practised by ancient Egyptians and very highly developed by Greeks. The story of Athletics from before the Olympic Games of 776 B.C. to date is not a continuous one. The Romans who followed the Greeks discontinued the Olympic Games. They were revived in 1896 at Athens and have been held every 4 years except 1916, 1940 and 1944. In 1880, the Amateur Athletic Association (A. A. A.) was founded in 1880 by England. The Association took over the organisation of the communal championships, and started the government of sports. In 1896 the first modern Olympic Games took place at Athens. Thereafter the Empire Games, the European Championships, the Balkan Games and many other international meetings and matches came into being. Championships and competitions of all standards were instituted in almost every country of the world. Athletic events are now standardised. Races are, generally, at one or another of a series of recognised distances and throwing and jumping events are held according to certain internationally agreed rules.

Baccarat is a game played with cards and with stakes.

Back. (Hockey and Football) player in Hockey and Football games behind half-backs and ahead of goal-keeper only.

Baseball is a national game of America. There are 9 players on each side.

Baffy (Golf) is wooden club used in the game of Golf.

Basketball. A ball game. In this game hands are used for propelling the ball.

Baulk also Balk (Billiard) is the area on the billiard table used as sanctuary.

Bails (Cricket) are the two cross wooden pieces which are placed over the three wickets.

Battledore and Shuttlecock is a game played with wooden bat and ball. The bat is known as Battledore and the ball as shuttlecock.

Billiard. A game played with three balls (two white, one red) on a flat table, with a cue.

Bisque (Croquet) is the right to play an extra turn.

Blind-man's Buff. In this game there are many players. One of them is blind-folded. He tries to catch any from among the players who elude him as best as they can. He who is caught is then blind-folded. The game continues thus.

Blue, the. A person who represents his university in games, sports or athletics. Oxford and Cambridge universities use blue colour in games and sports, the former uses dark blue and the latter uses light blue. The term derives its origin from there.

Blue Ribbon was awarded to the fastest crossing of the Atlantic by liner, but now a trophy is presented since 1935. The term is now used in a much wider sense to indicate the highest honour in any competition especially in sports or games.

Boat Race is contest in the art of rowing. Two teams representing two sides, each in one boat, try to go ahead of the other up or down a river.

Body-line bowling (Cricket). Very fast delivery of ball aimed at the body of the batsman instead of the wicket. The idea is to have the batsman caught out or stumped out while he struggles to defend himself.

Borrow (Golf) is an allowance for slope or opposite wind or to play the ball up hill to see it roll back.

Bowled. A batsman is bowled when he is out by the ball striking the wickets.

Boxing. In this game the persons fight with padded fists against each other according to prescribed rules. The number of rounds to decide the winner is settled beforehand. The weight gloves to be used by the players vary between 6 oz. to 8 oz. According to the weights of the competitors there are 8 forms of the game:—

Fly weight	= 112 lbs.	Bantam weight	= 118 lbs.
Feather weight	= 126 lbs.	Light weight	= 135 lbs.
Wolter weight	= 140 lbs.	Middle weight	= 160 lbs.
Light Heavy weight	= 175 lbs.	Heavy weight	= any weight.

Break (Cricket) is deflection of cricket-ball after it touches the ground from leg to off sides or from off to leg.

Bridge. A game of cards played by four persons at a time. Its name is derived from the Russian word *biritch.* The game originated from Russia and spread to other countries.

Bully-off (Hockey) is the initial crossing of sticks twice with the ball in between by two players one from each side. At the end of the crossing the ball is hit by one of the two players whoever may steal a chance. The game then starts.

Bump (Cricket) is rise of the cricket ball suddenly after touching the ground.

Bye (Cricket). If a run is scored without the ball being struck by the bat, a bye is scored. In other words it is run scored off the ball that passes a batsman and the wicket-keeper, without being touched by the bat, thus allowing time to the pair of batsmen to run between the wickets.

Caddle (Golf) is attendant-boy. He accompanies a golf-player with his playing equipment.

Cannon (Billiards). The striking of two balls successively by the ball of the player.

Carribage is a game at cards played with a pack of 52 cards and a score board having 61 holes for each player. Two or four players play the game.

Castle (Chess) is a dice used in the game. It is also called 'rook.'

Centre-Forward (Football and Hockey). The player who takes position in the middle of the field with two players to the left and two to the right of the forward line of his side.

Challenge Round is the final round in a tournament. It decides the winner.

Check (Chess). In 'check' king of one side is exposed to the attack by the pieces of the other side. If 'check' is not eliminated 'king' is defeated.

Checkmate (Chess). Check for the king of one of the sides in which it becomes a prisoner and cannot move in any direction to save itself.

Chess is an indoor game of skill played by two players with 32 'pieces' on a chequered board of 64 squares. A complete set of sixteen pieces with a king, a queen, two bishops, two knights, two castles and eight paws belong to each player. This game is said to be originated either in India or Iran.

Chukker (Polo). Each round of play.

Cleek (Golf) is a club which has a metal head. It is used in the game of Golf.

Collar (Rugby Football) is holding fast of player of the opposite side possessing the ball in a situation out of which he can escape only by throwing the ball away.

Contract Bridge is a card game. Here the declarer receives advantage for the fulfilment of his declaration only.

Coursing is a sport of hunting hares with the help of swift-running hounds and dogs.

Count-out (Boxing) is counting of 10 seconds at the end of which a fallen boxer is declared loser if he does not get up and resume the encounter.

Course. Special ground for racing tournament or competition.

Court. Prepared and definitely marked out ground for playing some outdoor games: Tennis, Badminton etc.

Cover-point (Cricket) is a point at which two fielders stand one behind the other so that if the first misses the ball, the second one may stop it.

Cow-shot (Cricket) is a sweeping hit scored by a player while in a bended position.

Crease (Cricket) is the line drawn by white chalk beyond which a batsman cannot go without the risk of being declared out. But when the ball is in the field after a hit and has not yet reached the wicket-keeper, a batsman is not declared out. Beyond the crease a bowler can take only one of his legs while bowling. The former line is known as 'popping crease' whereas the latter is called "bowling crease."

Cricket is a game played between the two sides of 11 players each side. It has two innings taken alternately except

in the case of a follow-on. Cricket ball weighs $5\frac{1}{2}$ to $5\frac{3}{4}$ ounces. Length of pitch is 22 yards.

Crocquet is an outdoor game played between two sides either of one or two players. Four mallets, six hoops and a peg are set out on a court 28 yards wide and 35 yards long. The game is played by four balls coloured Blue, Red, Yellow and Black. One side plays Blue and Black and the other Yellow and Red. Wooden balls are driven through hoops. The side which first scores its point wins.

Cross-country Race is a race run along roads, paths, fields and unfrequented regions. It is not run only on regular courses.

Cue (Billiards) is long road used for striking the ball. It gradually gets thin at one end and is covered with leather to protect it from scratching.

Cut (Cricket) is sending the ball to the off side with a hit by a straight bat.

Davis Cup is silver trophy for an international lawn tennis team, Dwight F. Davis, an American politician, introduced it in 1900. Davis Cup is a challenge trophy.

Decathlon. Athletics competition in Olympic Games. In this competition one player has to participate in ten events: jumps, races, discus throw, hurdles, short put, etc.

Derby is an international horse race. It is so named because Lord Derby originated it in England in 1780.

Deuce (Tennis) is a state of score (40 all, games all) in Tennis. In this position only two consecutive wins by either side or player can decide the set or the game.

Discus is round or oval piece of metal. Discus throwing is an item in the Olympic games.

Divot (Golf) is part of the turf that is cut out by a faulty stroke.

Draughts is a game of skill. It is played on a chequered board of 64 alternate black and white squares with 24 disks or draughtsmen.

Dribble is carrying the ball on the blade of the hockey stick and moving with it.

In Football, dribble is to kick forward the ball little by little.

Drop-kick (Football) is the kicking of the football as soon as it rises after having been dropped from hands.

Fairway (Golf) is regular course on the golf-link.

Follow-on (Cricket). When there is a difference of 150 runs between the teams, the leading team may call upon the other team to bat again and the second team can bat second time if necessary.

In a 'follow on' team goes to bat again for second time after finishing its first innings. It is forced upon it as it has not been able to score more than a small percentage of the runs collected by the other team.

Follow through (Golf). It is to carry stroke through to the farthest distance possible after the ball is struck.

Football is an open-air game. It is played with a large leather ball containing inflated rubber bladder. This game is of two kinds. In *Association Football* a spherical ball, 11 players on a side are required. The ball is not allowed to be touched with the hand. It can be touched or carried only by foot or head by players. The goal-keeper can use his hands as well.

In *Rugby Football* 15 players play on each side. An oval ball is used. The ball may be touched or carried by the hand, and the opponent can be held while holding the ball.

Football Australian is played with 18 players on each side, three full-backs, three half-backs, three centres, three half-forwards, three full-forwards, the three remaining have roving duties to follow play about the field. It is essentially a kicking game. Handling of the ball is allowed.

Full-Back (Hockey, Football) either of the two players whose position is between the half-backs and the goal-keeper.

Gambit (Chess). A move in which a player sacrifices pawn or other piece in order to turn the game in his favour later on.

Gobble (Golf) is a quick, straight put into the hole.

Golf is an outdoor game. It is played on a course of 4 miles or more in length, laid out on links *i.e.*, sandy ground. The link is provided with a series of holes from 9 to 18—of statutory diameter of 4½ inches into each of which it is the player's object to strike his ball successively in fewer strokes than his opponent.

Googly (Cricket) is a kind of blowing which deceives the batsman because he considers the ball to be leg-break, but actually it is off-break. It may also be its *vice versa.*

Grand National is the main cross-country horse-race in the United Kingdom. Its course is 4 miles 856 yards at Aintree (Liverpool).

Grand Prix. It is an international horse-race held at Long Champs, Paris, every year. Horses above the age of three years cannot take part in it.

Grub (Cricket) is underhand bowling along the ground.

Gully (Cricket) is the portion of the field which lies to the right side of the wicket-keeper but behind the wicket.

Gymnastics is an art of developing the body by suitable exercises.

Hat-trick (Football, Hockey, Tennis) is scoring of three goals one after the other by the same player in the games of Hockey or Football; three games similarly in Tennis, or taking off three wickets one after the other by one and the same bowler.

Hockey is an outdoor game. It is played between two teams of 11 players each with sticks and a ball. Its field is 100 yards by 55 to 60 yards.

Hook (Cricket) is to drive the ball round with the help of bat from off to one side before it pitches on the ground.

Hoop (Crocquet) is the round iron of the same thickness through which the ball is required to be knocked by each player.

Huff (Draughts) is to remove from the playground a piece which belongs to the opponent.

Innings (Cricket) is the play of one team or a batsman while occupied in batting.

In-Pass (Football, Hockey) is a pass of the ball from a back to the centre-forward.

Jack (Bowls) is the small ball which is placed at the end of rink. Each players tries to bring his bowls as nearer to the jack as it is possible for him.

Javelin is short, light spear which can be thrown.

Kicker (Cricket) is a ball that tends to rise all of a sudden from the pitch.

Kill (Tennis, Racquets) is the hitting of a ball so fast and in such a way that it becomes very difficult for the opposite side to return it.

King-pin (Bowls) is the main pin placed in the central position.

Knock (Cricket) is one innings game of a side or a batsman.

Links (Golf) is the ground where the game of golf is played.

Lacrosse. An outdoor game similar to Hockey. It is played by a stick, known as crosse, and a ball. The ball is either driven or carried in the crosse. Goal posts are 90 to 110 yards apart. There are no fixed dimensions of the boundary of the field. There are 12 players on each side.

L.B.W. (Cricket) stands for "leg before wicket". A batsman is out on account of l.b.w. if the ball pads on the batsman's leg (covering the wickets).

Lawn Tennis is played with a ball and racquets by two or four persons on a lawn or other smooth service. Single's court is 78 feet by 27 feet. Double's court is 78 feet by 36 feet.

Let is first service in Tennis.

Little Slam (Bridge) when one makes 12 tricks.

Lob (Cricket, Tennis) is to send a ball low with a slow motion in case of cricket, and to toss it with high-pitched motion in case of Tennis.

Lords' Cricket Ground. Headquarters of the M.C.C. and of Cricket generally in England.

Love is the position in games when neither side has scored as yet.

Maiden Over (Cricket) is any complete over bowled by a bowler in which a batsman has not been able to score any run.

Mallet (Crocquet). It is the striking bat.

Marathon (Race) is a race run over very long distances usually 26 miles and 885 yards. It is an item in the Olympic Games. Marathon took its name from the feat of Pheidippides who in 490 B.C., ran 24 miles, 1500 yards from the village of Marathon to Athens (in Greece) to return to Athens with news of victory against Darius, the greatest of all Persian Emperors.

Mashie (Golf) is the iron club with short, rounded head used in the game of Golf.

M.C.C. stands for Marylebone Cricket Club. It is the governing body in England.

Muttra Cup is a trophy for hoghunting.

No-Ball (Cricket). If the bowler puts both his feet across the bowler-last line while throwing the ball it is said to be 'no-ball'. It does not affect the batsman in any way, but it adds one run to the score.

Oakes is an international race. It is run annually at Epsom in England subsequent to the Derby. It is open to thorough-bred mares of not more than three years of age. The course of this race is 1 1/2 mile.

Off-Side (Hockey, Football, Cricket). A player is declared off-side by the referee if he is near his opponent's goal line than the ball, at the moment the ball is played. In Hockey and Football, space between the goal of the opposite side and the ball in which area the players of the other side cannot go without the risk of being penalised. In Cricket, it is the portion of the field in front of the wicket-keeper to the right of him.

Olympia. Famous Greek religious, political and athletic centre; situated on the northern bank of River Alpheus, near the west coast of South Greece, below the sacred Cronion Hill, was the scene of Olympic Games. By the fifth century A.D. earthquakes, pillage and neglect had desolated the site. Archaeological excavations began in the late 19th century.

The principal discoveries have been the great altar where divination and other practices took place. The Pelopium, a small building in which sacrifices were offered to Pelops, the temple of the Great Mother of gods, the Heracum or Temple of Hera; and the Temple of Zeus have been discovered. The stadium shows the various entrances, the starting lines, seating accommodation and the drainage.

Olympiad, a period of four years between two successive celebrations of the Olympic Games. The ancient Greeks reckoned dates by Olympiads. The first Olympiad began about 776 B.C.

Olympic Games. Please see Topic on 'Olympic Games and World Records'.

Olympus, a peak nearly 10,000 ft. high in a range of mountains between ancient Thessaly and Macedonia in Greece. It was believed to be the home of the gods, under the supreme rule of Zeus.

Olympic Torch is kindled on the Mount Olympus in Greece by the heat of the sun and it is carried by relay to a place selected for holding Olympic Games. The torch is kept burning continuously till the games are over.

On-Side (Cricket). The space of the field in front of the wicket-keeper to the left of him.

Outfighting (Boxing) is fighting between boxers when they are at an arm's length apart from each other.

Out-field (Cricket) is that portion of the field which is away from the pitch near the boundary lines.

Overthrow (Baseball, Cricket) is the return of the ball by a fielder which cannot be stopped at the wicket or the bass. The player, thus, scores further runs.

Pawn (Chess) is the piece having value which is least of all.

Pitcher (Baseball) is the player who delivers the ball.

Ping-Pong (Table Tennis) is an indoor game. It is played on a special table with small, light, wooden bats and small celluloid balls. Each ball should pitch in the area of the server and then bounce into the court of the opponent. Volleying is not allowed. Each player is allowed to serve five services one after the other.

Place-kick (Football) is the kick at a ball by a player when the ball has been placed in position of a kick by another player.

Play (Cricket) is to strike at the ball just to save his wicket.

Polo is an outdoor game like Hockey. It is played by two teams of 4 persons riding on horses or ponies with T-shaped polo-sticks and a ball. The ball is brought to be carried to the opponent's goal by a T-shaped polo-stick. Ground is 300 yards by 200 yards and goals are not less than 250 yards apart. It is an ancient game which originated in Iran. From there it spread to the Eastern countries.

Pool is an indoor game. It is played on a billiard-table among a number of players. Every player has a ball of different colours with which he tries by turn to pocket that of others. He who gets the entire collection of stakes wins.

Punt (Football) is to kick football before it touches the ground after having been released from hand.

Put (Golf) is to strike the ball slowly towards the hole.

Quoit (Quoits) is sharp-edged iron ring thrown to encircle fixed iron peg.

Racquet (Tennis, Racquets) is the bat with surface woven in cat-guts.

Rally (Tennis), Strokes exchanged between opponents at a very great speed.

Rot (Cricket) is dismissal of a number of good batsmen one after the other without adding appreciably to the score.

Rubber is a series of generally five Test Matches in Cricket. The team winning three out of the five is said to have won the Rubber.

Ryder Cup is a trophy for Golf Championship.

Schneider Trophy is an international sea-plane race trophy. It was offered by Jacques Schneider and was permanently annexed by Britain.

Service (Tennis) is the turn of a player to begin serving the ball.

Set (Tennis) is a number of games in favour of winner, counted as one unit.

Silly point (Cricket). The points just in front of the batsman at about 5 to 10 yards from him. It is a position in fielding on the off-side close up to the batsman.

Skate is one of a pair of devices made of iron plate with four wheels below it attached to the shoes. This enables a person to guide on snow or on specially prepared hard ground.

Ski. One of a pair of specially made wooden shoes tied under a foot so as to help a person walk easily on ground covered with snow. The shoes are especially used in Norway, Sweden, etc.

Ski-ing is the art of walking on boards strapped to feet called skis. It originated in Norway and Denmark. It is popular in Switzerland.

Skittled Out (Cricket). Dismissed for a small number of runs.

Smash (Tennis) is to strike the ball at the net so forcibly that it goes down on the other side that it cannot be returned.

Sneak (Cricket) is the ball thrown underhand such that it runs along the ground.

Soccer is another name for the game of Association Football.

Spoon (Cricket) is to hit the ball high up quite easy to catch.

Stadium is Greek measure of length for a race. There-after it came to signify the place where such races are held.

Stalemate (Chess) is the position where no move is possible for a player. But still he is not defeated as his king is not in check. The game is considered drawn in such a case.

Sticks. In the Hockey game the term is used when the player while striking the ball raises the hockey stick above his shoulders.

St. Ledger is English classic horse race. It is run at Doncaster in the month of September.

Stone-walling (Cricket) is defensive batting by a batsman

to save his wicket. The idea is either to tire out bowler or give continuous chance to the other player.

Stumps (Cricket) is one of the three wooden pieces. They together form the wicket.

Stymie (Golf). It is the case when the ball of the opponent lies between his own and the hole. In such a case it is difficult for a player to score a hole.

Swaythling Cup is World Table Tennis Championship. It is open to men.

Swip (Cricket) bid to score a big hit by moving bat wildly. It is very often that a wicket is lost in this way.

Table Tennis. See Ping-Pong.

Tee (Golf) is a small mound of earth. The player places the ball on it to strike it at the beginning of play for each hole.

Test Match. Cricket matches between countries of the British Empire. The term originated from England-Australia test matches.

Thomas Cup is an international Badminton Trophy. Different countries of the world compete on the Davis Cup lines.

Tie. Sometimes it so happens that one or more competitors or competing teams make exactly equal points or scores. This position is known as a tie.

Tip (Cricket) is to make a light stroke with bat and thus change the direction of the ball.

Tip-and-Run (Cricket). The case in which a batsman must run at least for one run if his bat touches the ball.

Trophy. A thing given as prize to the side which wins in games and sports.

Tug-of-War. In this sport two groups of persons hold equal portions of the same thick rope and pull in opposite directions. The side which pulls the other side across the middle line wins the contest.

Volley. The term is used in Volleyball. It is to strike the ball with great force before it is allowed to pass on to the other hands.

In Tennis it means striking the ball before it is allowed to strike the ground. The term is also applied to Table Tennis.

Water-Polo is played by swimmers in water with a ball. The water is not shallower than three feet. The distance between goals does not exceed 30 yards and is not less than 19 yards. Each side consists of 7 players. The ball is attempted to be carried by hands towards clearly marked goals.

Weightman Cup is a trophy for women's international championship held at Wimbledon.

Wide-Ball (Cricket) is a ball that passes over the head of the batsman. If the batsman cannot tackle it one run is counted scored.

6. Olympic Games. The great athletic national festival of ancient Greeks was held every four years at Olympia lasting about five days. The great athletic meetings in ancient Greece began at an unknown date. What may be called the first historical games were celebrated about 776 B.C. by the Greeks in honour of god Zeus at Olympia. They continued to be held every four years for about 1075 years (776 B.C. to 394 A.D.). To be declared the winner at the Games was the ambition of every Greek, as the victor won great glory and considerable wealth. No slaves, foreigners or dishonoured persons were permitted to compete. Women were neither allowed to participate nor witness these games. The Olympic Games became defunct in the 4th century A.D.

Revival of the Olympic Movement. Olympia, the site of the ancient games, was sacked and looted by barbaric invaders near about 394 A.D., when the games had to be suspended. Subsequent earthquakes, change of course of the Rivers Alpheus and Cladeus buried the beautiful little city beneath sand and silt, for over 1300 years. In the middle of 19th century, European scientists and historians dug Olympia out of the sands of time and oblivion. The spirit and glory of the ancient games also revived. Baron de Coubertin, a French nobleman, took up the task of reviving the games believing that friendly international competitions

might teach the youth of the world international understanding. "Olympia and Olympics symbolize an entire civilization, superior to countries, cities, military heroes, or even the ancient religions," he wrote on June 15, 1894, in a circular letter to all amateur sports organisations throughout the world. Through his sincere, untiring efforts he succeeded in re-establishing the Olympic Games. The first Olympic Games of the Modern Era were staged in 1896. He is truly called the founder and father of the modern Olympic Games. From 1896 to 1945 he was President of the I.O.C. (International Olympic Committee).

"The important thing in the Olympic Games is not to win but to take part, the important thing in life is not the triumph but the struggle, the essential thing is not to have conquered but to have fought well. To spread these precepts is to build up a stronger and more valiant and, above all, more scrupulous and more generous humanity." This is the spirit of his work.

The Olympic Organisation. With the revival of the Olympic Games of the modern era in 1896, the Olympic Movement was set in motion and has continued to gather momentum with the passage of time.

The manner in which the International Olympic Committee, which is in charge of the Movement, was constituted by its far-sighted founder, Baron de Coubertin, has contributed much to the Olympic Movement. The members chosen were free from economic and political pressure. The Committee was made self-perpetuating. The members organise the National Olympic Committees in their own countries and thus establish fidelity of the Olympic Principles. The great strength of the International Olympic Committee lies in the character of the individual member and not the land of his birth. It is the man and not country he comes from that counts. Recognition of a National Olympic Committee implies no obligation on the part of the I.O.C. to elect a member from the country. Great care is taken to see that persons with a considerable knowledge of and experience in amateur sports, men of strong character, national prestige, international understanding and independent spirit are chosen.

The Headquarters of the I.O.C. is located at Lausanne in Switzerland. A country which desires to participate in the Olympic Games must have a National Olympic Committee accepted by the I.O.C.

The International Olympic Committee to which the Congress of Paris entrusted the control and development of the Modern Olympic Games in 1894, is responsible for:

(1) the regular celebration of the Games;

(2) making the Games ever more worthy of their glorious history and of the high ideals which inspired their revival by Coubertin and his associates;

(3) encouraging the organisation of amateur sports competition; and

(4) guiding and leading amateur sports along the right lines thereby promoting and strengthening friendship between the sportsmen of all countries.

These objects and fundamental principles guide the International Olympic Committee in their organisation of Olympic Games—the greatest and the oldest show on earth.

Since 1896 the Olympic Games are held every fourth year at different places. Almost all nations participate in them. All the countries having their National Olympic Games Associations can take part in the World Olympiad. A list of places with years where the Games were held is given below.

Year	*Place*	*Year*	*Place*
1896	Athens	1936	Berlin
1900	Paris	1940	Tokyo (later) Helesinki; not held on account of World War II
1904	St. Louis		
1908	London		
1912	Stockholm		
1916	Berlin (not held on account of War)	1944	London (not held on a/c of World War II)

Year	*Place*	*Year*	*Place*
1920	Antwerp	1948	London
1924	Paris	1952	Helesinki
1928	Amsterdam	1956	Melbourne
1932	Los Angeles	1960	Rome

The games include the usual field events: swimming, yachting, boxing, canoeing, cycling, hockey, football, basketball, wrestling, fencing, weight lifting-gymnastics, petathlon, decathlon, throwing of quoit and javelin, an Art Exhibition etc.

Olympus, Olympia, 'Olympiad,' Olympic Torch please consult previous pages under "Terms".

PART X

ABBREVIATIONS AND FOREIGN PHRASES

Chapter I

ABBREVIATIONS

A.	*Anno:* in the year.
A.A.	Anti-aircraft.
@	at
A.A.C.	*anno ante Christum:* in the year before Christ.
A.A.R.	Against All Risks.
A.C.	*Ante.Christum:* before Christ; (elect.) Alternating Current.
A/C	Account: Account Current.
A.C.A.	Associate of the Chartered Accountants.
A.D.	*Anno Domini:* in the year of our Lord.
a.d.	After date; *ante diem*; before the day.
A.C.C.	The Associate Cement Company.
Add.	Addatur (Latin); let there be added.
Ad. Inf.	*Ad infinitum:* go on counting without end.
Ad. int.	*Ad interum:* in the meanwhile.
Adm.	Admiral.
Admn.	Administration.
A.D.B.P.	Agricultural Development Bank of Pakistan.
A.D.C.	Aide-de-camp ; Agricultural Development Corporation.
A.E.C.	Army Educational Corps, Atomic Energy Commission.
A.F.	Admiral of the Fleet, Army Form.
A.F.C.	Assistant Food Controller.
A.F.M.	Air Force Medal.
A.G.	Accountant-General; Adjutant-General, Advocate-General.
A.H.	*Anno Hegirae*; in the year of Hegira—*i.e.* from *Hijrat* of Muhammad the Prophet (622 A.D. 13th September), *Anno Hebrew:* The Jewish-calender (add 3760 to the Christian year).
A.H.Q.	Army Headquarters.
A.I.C.C.	All-India Congress Committee.

A.I.L.O.	Asian International Labour Organisation.
A.I.R.	All India Radio.
Alig.	Aligarh.
A.M.	Air Ministry. *Ante meridiem:* before noon, before midday. *Artium Magister:* Master of Arts.
a.m.	*Anno Mundi:* in the year of the world. *Annus Mirablis:* the wonderful year (1666). *Ave Maria:* Hail Mary.
A.M.C.	Army Medical Corps.
A.M.I.C.E.	Associate Member of the Institute of Civil Engineers.
A.M.I.E.E.	Associate Member of the Institute of Electrical Engineers.
A.M.S.	Army Medical Service.
Anon	Anonymous.
ANZUS	Australian, New Zealand and U.S. (defence group for security of the Pacific).
A.O.	Army Order; Accounts Officer.
A.O.C.	Army Ordnance Corps.
A.O.D.	Army Ordnance Depot.
A.P.	Associated Press.
A.P.A.	Associated Press of America.
A.P.I.	Associated Press of India.
A.P.P.	Associated Press of Pakistan.
A.P.T.C.	Army Physical Training Corps.
A.P.W.A.	All-Pakistan Women Association.
A.R.	All Risks, Army Regulations.
A.R.D.	Army Remount Department.
A.R.P.	Air Raid Precautions.
art.	Articles; Artillery.
A.S.	At sight.
A.S.A.A.	Associate of Society of Incorporated Accountants and Auditors.
A.S.C.	Army Service Corps.
A.S.I.	Assistant Sub Inspector (Police).
Asst.	Assistant.
A.T.S.	Army Transport Service.
A.U.C.C.T.U.	All-Union Central Council of Trade Unions.
A.V	Artillery Volunteers.

A.V.D.	Army Veterinary Department.
A.V.S.	Army Veterinary Service.
B.A.	*Baccalaureus Artium:* Bachelor of Arts. British America; British Association; British Academy.
bach.	Bachelor.
B. Agr.	Bachelor of Agriculture.
Bar.	Barrister.
bar.	Barometer; Barrel.
Bar-at-law	Barrister-at-law.
B.B.C.	British Broadcasting Corporation.
B.C.	Before Christ; Board of Control; Battery Commander; British Columbia.
B.C.C.P.	Board of Control of Cricket in Pakistan.
B.C.G.	*Bacillus Calmette Guerin* (T.B. Vaccine).
B.C.L.	Bachelor of Civil Law.
B.Com.	Bachelor of Commerce.
B.C.O.F.	British Commonwealth Occupation Force.
b/d	Brought down.
B.D.	Basic Democracies; Bachelor of Divinity; Bank Draft.
B.D.S.	Bachelor of Dental Surgery.
B.E.	Bachelor of Engineering, Board of Education; Bill of Exchange.
B.E.Co.	Batala Engineering Company.
B.F.	Brought forward.
B.O.L.	Bachelor of Oriental Languages.
B.Ed.	Bachelor of Education.
B.H.P.	Brake Horse-Power.
B.I.S.	Bank of International Settlements, British Information Service.
Bldg.	Building.
b.l.	Bill of lading.
B.L.	Bachelor of Law.
B.M.	Bachelor of Medicine; *Baetae Memoriae* of blessed memory; British Museum; Brigade-Major.
B. Mus.	Bachelor of Music.
B.M.E.	Bachelor of Mining Engineering.
b.o.	Branch Office; Brought over.
B.O.C.	Burmah Oil Company.
B.O.A.C.	British Overseas Airways Corporation.

B.O.T.	Board of Trade.
B.P.	Bread of Pakistan.
b.p.	Bills payable; Bill of parcels; Birthplace.
B.P.C.	Basic Principles Committee.
B. Pharm.	Bachelor of Pharmacy.
Bros.	Brothers.
B.R.D.	Bank for Reconstruction and Development.
Brig.	Brigadier.
B.S.	Bachelor of Surgery, or Science.
b/s	Bales.
b./s.	Bill of Sale.
B.S.A.	Birmingham Small Arms (Co.); British South Africa.
B.Sc.	*Scientiae Baccalaurus:* Bachelor of Science.
B.T.	Bachelor of Teaching.
B.V.	*Bane Vale*; Farewell; also *Beata Virgo:* Blessed Virgin.
B.V.M.	The Blessed Virgin Mary.
C.	Centigrade.
c., cet., cent.	*Centum:* a hundred.
C.A.	Constituent Assembly; Chartered Accountant; Commercial Agent.
C./A.	Current Account.
C./B.	Cash Book.
Camb., Cam.	Cambridge.
Cantab.	*Cantabrigiensis:* of Cambridge.
Cantt.	Cantonment.
Caps.	Capitals.
Capt.	Captain.
C.A.R.E.	Co-operative for American Remittance to Europe.
C.C.	Cricket Club; County Council.
c.c.	Chapters.
Cde.	Commodore.
Cdt.	*Cadet:* a youth studying or qualifying for a commission in the Army, Navy or Air Force.
C.d'A.	Charge d' Affaires.
C.C.A.	Commission for Conventional Arms.
C.D.A.	Capital Development Authority.
C.E.	Civil Engineer; Chief Engineer; Church of England; Canada, East.

C.E.A.	Central Engineering Authority.
C.E.C.	Chief Election Commissioner.
cf.	*Confer*; compare from; calf.
c. & f.	Cost and freight.
Cent.	*Centum:* a hundred.
c.f. & i.	Cost, freight and insurance.
cg.	Centigram.
CENTO	Central Treaty Organisation (formerly Baghdad Pact).
C.G.S.	Chief of General Staff, Centimetre, Gramme, Second..the units of length, mass and time.
C.H.	Companion of Honour.
Chap.	Chapter; Chaplain.
C.I.A.	Criminal Investigation Agency.
C.I.D.	Criminal Investigation Department.
c.i.f.	Cost, insurance, freight.
C.I.O.	Committee for Industrial Organisation.
C.-in-C.	Commander-in-Chief.
C.J.	Chief Justice.
C/L.	Cash Letter.
C.M.	Certificated Master; Common Meter; *Chirurgiae Master*; Master of Surgery.
C.M.A.	Controller of Military Accounts.
C.M.H.	Cantonment Military Headquarters.
C.M.O.	Chief Medical Officer.
C.M.P.	Corps of Military Police.
C.N.A.C.	China National Aviation Corporation.
C.O.	Commanding Officer; Crown Office. Colonization Officer.: Conscientious Criminal Office; Objector.
c/o	Care of.
Co.	Company.
c.o.d.	Cash (or collect) on delivery.
Col.	Colonel; Colorado Column.
Coll.	College; Colleague; Collector; Colloquial.
Contd.	Continued.
Comisco.	Committee of the International Socialist Conferences.
Consembly.	Constituent Assembly.
C/N.	Credit Notes, Central News (Agency).
C.O.P.	Combined Opposition Parties.

Co-op.	Co-operative.
C.P.	Candle-power, Communist Party.
C.P.C.	Civil Procedure Code.
Cr. P.C.	Criminal Procedure Code.
C.P.N.E.	Council of Pakistan Newspapers Editors.
C.R.A.	Chittagong Regional Authority.
Cr.	Credit; Creditor; Crown.
C.S.	Civil Service, Court of Sessions.
c.s.	Correction Slip.
C.S.I.R.	Council of Scientific and Industrial Research.
C.S.M.	Company Sergeant-Major.
C.S.P.	Congress Socialist Party, Civil Service of Pakistan.
C.S.S.	Central Superior Services.
C.S.S.P.	Central Superior Service of Pakistan.
C.T.	Certified Teacher; Commercial Traveller.
C. Wealth.	Commonwealth.
c.w.o.	Cash with order.
c.w.t.	A hundredweight—*c* for *centum*, a hundred and *wt.* for weight.
d.	*dele*; Delete; Dead or died; Deserted, Degree: *denarius* or *denari*, penny or pence.
D.A.	Daily Allowance. Dearness Allowance; Director of Agriculture; Divisional Accountant; Documents Attached.
D. (A) A.G.	Deputy (Assistant) Adjutant-General.
D.A.G.	Deputy Adjutant-General; Deputy Auditor-General; Deputy Accountant-General.
D.A.Q.M.G.	Deputy Assistant Quartermaster-General.
D.B.	District Board.
D.C.	Deputy Commissioner; (*elect.*) Direct Current; Divisional Council; District Council.
D.C.L.	Doctor of Civil Law.
D/d.	Date after delivery.
D.D.	*Divinitatis Doctor:* Doctor of Divinity.
D.d.	*Deo Dedit* Gave to God.
D.D.D.	*dat, dicat, dedicat:* He gives, devotes and dedicates: *Dono dedit dedicavis:* He gave and dedicated as a gift.
D.D.G.	Deputy Director-General.
Dec.	December.

dec.	Declaration.
def.	Definition.
deg.	Degree; Degrees.
Del.	Delegate.
Dent.	Dental, Dentist, Dentistry.
Dept.	Department.
D.F.	Dean of the Faculty; Defender of the Faith.
D.F.G.	District Food Controller; Distinguished Flying Cross.
D.F.M.	Distinguished Flying Medal.
D.F.P.	Disopropyl Eluro-phosphate (a kind of poison gas).
D.G.	Director-General; *Dei Gratia:* by the grace of God; Dragoon Guards.
D.G.P.T.	Director-General of Posts and Telegraphs.
D.H.C.	Deputy High Commissioner.
D.I.A.	Diploma in International Affairs.
diam.	Diameter.
D.I.G.	Deputy Inspector-General.
dist.	District; Distance; Distinguish.
div.	Divide; Division; Divine.
D.Lit or Litt.	Doctor of Literature.
D.L.O.	Dead Letter Office.
D.L.T.	Daily Letter Telegram.
D.M.	District Magistrate; Daily Mail.
D.N.B.	Dictionary of National Biography.
D.O.	Demi-official; Delivery Order.
do. Do.	*ditto:* the same.
D.O.L.	Doctor of Original Learning.
D.P.H.	Diploma in Public Health. Director of Public Health.
D.Ph. D.Phil.	Doctor of Philosophy.
D.P.I.	Director of Public Instruction.
D.P.M.	Diploma in Psychological Medicine.
D.P.O.	Distributing Post Office.
Dr.	Doctor; Driver; Drummer.
D.P.R.	Director of Public Relations.
D.Sc.	Doctor of Science.
D.S.C.	Distinguished Service Cross.

D.S.M.	Distinguished Service Medal.
D.S.O.	Distinguished Service Order; District Staff Officer.
d.s.p.	*decessit sine prole*; died without issue.
D.S.P.	Deputy Superintendent of Police.
D.T.	Daily Telegraph.
D.T.M.	Diploma in Tropical Medicine.
D.T.S.	Divisional Traffic Superintendent.
D.V.	*Deo volente:* God willing, if God wills.
d.v.p.	*decessit vita patris:* died in his father's lifetime
D.W.	Dock warrant.
dwt.	Pennyweight—*d* for *denarious*, penny; and *wt.* for weight.
D.R.O.	Deputy Rehabilitation Officer.
E.	East.
E.A.D.A.	Extra Assistant Director of Agriculture.
E.A.S.O.	Extra Assistant Settlement Officer.
E.A.T.	European Army Treaty.
E.B.	Eastern Branch; Encyclopaedia Britannica.
E.B.R.	Eastern Bengal Railway.
E.C.A.	Economic Co-operation Administration (U.N.O.)
E.C.A.F.E.	Economic Commission for Asia and Far East (U.N.O.)
E.C.M.	European Common Market.
E.C.M.E.	Economic Commission for Middle East (U.N.O.)
Eccl., Eccles.	Ecclesiasts, Ecclesiastical.
Ed.	Editor, Edited, Edition, etc.
E.D.C.	European Defence Community (Pact).
e.g.	*examplia gratia:* for example.
E.I.	East Indies.
E.-in-C.	Engineer-in-Chief.
E.I.R.	East India Railway.
E.M.S.	Emergency Medical Service.
Ency., Encyc.	Encyclopaedia.
E.N.E.	East-North-East.
Eng.	Engineer; Engraver; England, English.
E. & O.E.	Errors and Omissions Excepted.
E.P.T.	Excess Profits Tax.
E.P.U.	European Parliamentary Union.

E.R.P.	European Recovery Plan (U.N.O.).
E.S.E.	East-South-East.
Esq., Esqr.	Esquire.
Est., Estd.	Established.
et. al	*et alibi*, and elsewhere; or *et alli* or *alia:* and others.
etc., &c.	*et ceteri* or *cetera:* and others, and so forth.
et seq., sq. or sqq.	*et sequentes* or *squentia* and the following.
ex.	Example; Exception; Examined; Executive; Export.
Exam.	Examination.
Exc.	Excellency.
Ex. div.	Exclusive of Dividend (without dividend).
E.W.O.	Essential Work Order.
F.. Fahr.	Fahrenheit.
f.	Farthing; Fathom; Foot.
F.A.	Football Association: Faculty of Arts.
F.A.A.	Fleet Air Arm.
F.A.O.	Food and Agriculture Organisation (of (U.N.O.).
F.A.S.	First Aid Post.
F.A.P.	Fellow of the Society of Arts. Free Alongside Ship.
F.B.	Full Bench.
F.B.S.	Fellow of the Botanical Society.
F.B.I.	Federation of British Industries: Federal Bureau of Investigation (U.S.A.).
F.C.A.	Fellow of the Institute of Chartered Accountants.
F.C.I.S.	Fellow of the Chartered Institute of Secretaries.
fop., fcap.	Foolscap.
F.C.R.	Frontier Crimes Regulations.
F.D.	Finance Department; *Fiedi Defensor:* Defender of the Faith. (Title of the Kings or Queens of England).
Feb.	February.
F.G.S.	Fellow of the Geological Society.
F.I.A.	Fellow of the Institute of Actuaries.
F.I.C.	Fellow of the Institute of Chemistry.
F.F.P.S.	Fellow of the Faculty of Physicians and Surgeons.

fig.	Figure, Figuratively.
F.I.J.	Fellow of the Institute of Journalists.
F.L.N.	(Algerian) National Liberation Front.
Flt.	Flight.
Flt.-Lt.	Flight-Lieutenant.
F.M.	Field-Marshal.
fm.	Fathom (equal to 6 feet).
F.O.	Flying Officer, Field Officer, Foreign Office.
f.ol, fol.	Folio.
f.o.b.	Free on Board.
f.o.r.	Free on rail.
F.P.A.	Foreign Press Association.
F.P.I.	Freedom of Press Information.
F.P.S.	Foot, Pound, Second; Fellow of the Philological Society.
F.P.S.C.	Federal Public Service Commission.
Fr.	Friday: France; French; Fair.
fr.	Fragment: France; Frequently.
F.R.A.S.	Fellow of the Royal Astronomical Society; Fellow of the Royal Asiatic Society.
F.R.C.S.	Fellow of the Royal College of Surgeons.
F.R.C.V.S.	Fellow of the Royal College of Veterinary Surgeons.
F.R.G.S.	Fellow of the Royal Geographical Society.
F.R.S.	Fellow of the Royal Society.
F.R.S.A.	Fellow of the Royal Society of Arts.
F.S.A.A.	Fellow of the Society of Incorporated Accountants and Auditors.
F.S.E.	Fellow of the Society of Engineers.
F/sgt.	Flight-Sergeant.
F.S.I.	Fellow of Surveyors Institution.
F.S.I.A.	Fellow of the Society of Incorporated Accountants.
F.S.R.	Field Service Regulations.
F.S.S.	Fellow of the Statistical Society.
ft.	Foot, Feet, Fort.
F.T.U.	Federation of Trade Unions.
fth. fthm.	Fathom.
fur.	Furlong.
F.Z.S.	Fellow of the Zoological Society.
G.A.	General Assembly.

gal.	Gallon.
gall.	G. llons.
G.A.T.T.	General Agreement on Trade and Tariffs.
G.C.F.	Greatest Common Factor.
G.C.M.	Great Common Measure; General Court-Martial.
G.D.A.	Government Diploma in Accountancy.
Gen., Genl.	General.
Gen.	Genesis.
Gent., Gents.	Gentleman, Gentlemen.
geog.	Geography.
geol.	Geology
Geom.	Geometry.
G.E.C.	General Electrical Company.
G.H.Q.	General Headquarters (Military).
Gk.	Greek.
gm.	Gramme.
G.M.T.	Greenwich Mean Time.
G.O.	General Order; Grand Or, an.
G.O.C.	General Officer Commanding.
G.O.C.-in-C.	General Officer Commanding-in-Chief.
Gov.	Government; Governor.
Govt.	Government.
G.P.	General Practititioner; Grateful Patient.
G.P.O.	General Post Office.
G.P.U.(or O.G.P.U.)	Soviet Russia's Secret Political Police. (Obyedinyannoye Gossudarstvennoye Polititcheskoye Upravlyenine—United Political State Administration).
Gr.	Greek.
gr.	Grain; Grammar; Gross; Gunner.
G.R.	General Reserve.
Gram.	Grammar.
G.S.	General Staff; General Service.
gym.	Gymnasium.
hr.	Hour.
H.C.	House of Commons.
h. and c.	Hot and Cold (Water Tap).
h.c.f.	Highest Common Factor.
H.E.	His Excellency; His Eminence.
H.E.H.	His Exalted Highness.

H.H.	His (or Her) Highness; His (or Her) Holiness
H.I.H.	His (or Her) Imperial Highness.
H.I.M.	His (or Her) Imperial Majesty.
Hist.	History.
H.J.	Hilal-i-Jura't.
H.L.	House of Lords.
H.M.	His (or Her) Majesty.
H.M.V.	His Master s Voice.
Hons.	Honours.
Hon.	Honorary; Honourable.
h.p.	Horse Power; Half-pay.
H.Q.	Headquarters.
H.R.	Home Rule; House rent.
H.R.I.P.	Here Rests in Peace (*hic requiescit in pace*).
H.W.M.	High Water Mark.
I.A.C.P.	Investment Advisory Centre of Pakistan.
I.A.E.A.	International Atomic Energy Agency.
I.A.M.Y.	International Assembly of Muslim Youth.
I.A.S.	Indian Administrative Service.
I.A.T.A.	International Air Transport Association.
ib., ibid.	In the same place, *ibidem*.
i/c.	In charge of.
I.B R.D.	International Bank for Reconstruction and Development.
I.C.	Intelligence Corps.
I.C.A.O.	International Civil Aviation Organisation (U.N.O.).
I.C.C.	International Chamber of Commerce.
I.C.E.F.	International Children's Emergency Fund. (U.N.O.).
I.C.E.	Institution of Civil Engineers.
I.C.F.T.U.	International Conference of Free Trade Unions.
I.C.I.	Imperial Chemical Industries.
I.C.J.	International Court of Justice.
I.D.	Intelligence Department.
I.D.A.	International Development Authority.
id.	*idems*, the same.
i.e.	*id est:* that is.
I.E.F.C.	International Emergency Food Council.
I.F.A.P.	International Federation of Agricultural Producers.

I.G.	Inspector-General (of Police, etc.)
i.h.p.	Indicated horse-power.
I.L.O.	International Labour Organisation (U.N.O.).
I.L.P.	Independent Labour Party.
I.P.I.	International Press Institute.
I.P.U.C.	International Parliamentary Union Conference.
I.L.T.F.	International Lawn Tennis Federation.
I.M.F.	International Monetary Fund (U.N.O.).
I.M.O.	International Meteorological Organisation (U.N.O.).
I.N.A.	Indian National Airways.
I.N.C.	Indian National Congress.
Incog.	*incognito*: unknown, avoiding publicity.
indef.	Indefinite.
inf.	*infra*; below; Infantry; Infinitive.
init	*initio*; in the beginning.
inst.	Instant, the present month; Institute.
int.	Interest; Interior; Interpreter.
inv.	Invoice.
I.O.J.	International Organisation of Journalists.
I.O.U.	I owe you.
i.q.	*idem quod*: the same as.
I.R.C.	International Red Cross.
I.R.F.	International Road Federation.
I.R.O.	International Refugee Organisation.
Is.	Island.
I.S.C.	Indian Staff Corps.
I.S.F.	International Students Federation.
I.S.S.B.	Inter-Services Selection Board.
I.T.O.	Income Tax Officer.
I.T.U.	International Telecommunication.
I.W.W.	Industrial Workers of the World.
J.	Judge.
Jan.	January
J.B.	John Bull (typical Englishman).
J.C.	Jesus Christ: Justice Clerk.
J.C.C.	Junior Cadet Corps.
J.C.D.	Juris Civilis Doctor; Doctor of Civil Law.
J.C.O.	Junior Commissioned Officer.
J.D.	Diploma in Journalism.
J.E.I.A.	Joint Economic Intelligence Administration.

Jn.	June; Junction.
JJ.	Judges.
J.P.	Justice of the Peace.
Jr.	Juror, Junior.
Jud. Judg.	Judges.
Jun.	June.
Jul.	July.
J.S.P.C.T.S.	Joint Services Pre-Cadet Training School.
K.B.	Khan Bahadur; Knight of the Bath; King's Bench. Knight Bachelor.
Kil.	Kilometer.
Kilo; kg.	Kilogramme.
K.D.A.	Karachi Development Authority.
K.K.K.	Ku-Klux-Klan.
K.L.F.	Kashmir Liberation Front.
K.L.M.	Kashmir Liberation Movement.
K.H.T.	Koumintang.
K.M.C.	Karachi Municipal Corporation.
K.O.	Knock out.
K.P.T.	Karachi Port Trust.
K.R.C.	Knight of the Red Cross.
K.W.	Kilowatt.
K.U.J.	Karachi Union of Journalists.
K.V.A.	Kilowatts, volts; amperes.
L.	Lake; Left; (pound) Liberal. 50 (Roman numeral).
Lat.	Latitude; Latin.
lb.	*Libra*, a pound (weight).
l.b.w.	Leg before wicket (in cricket).
l.c.	Lower Case (in printing); Letter of Credit.
L.C.J.	Lord Chief Justice.
L.C.M.	Lowest Common Multiple; Least Common Measure.
Ltd.	Limited.
L.D.S.	Licentiate in Dental Surgery.
L.F.P.S.	Licentiate of the Faculty of Physicians and Surgeons.
Leg.	Legal; Legislature.
L.I.	Light Infantry.
Lieut;Lt.-Col.	Lieutenant-Colonel.

Lieut. or Lt. Gen.	Lieutenant-General.
Lit.	Literature; Literally.
LL.B.	Bachelor of Laws (*Legum Baccaluureus*).
LL.D.	Doctor of Laws (*Ligum Doctor*).
LL.M.	Master of Laws.
long.	Longitude.
L.P.R.	Leave Preparatory to Retirement.
L.O.P.	Look Out Post (place to see progress of war).
L.R.	Legal Remembrancer.
L.R.C.P.	Licentiate of the Royal College of Physicians of Edinburgh.
L.R.C.S.	Licentiate of the Royal College of Surgeons.
L.s.	Left side; Lance-Sergeant.
L.s.d.	Pounds, Shillings, Pence, (*Libra Solidt, denarii*).
L. Sgt.	Lance-Sergeant.
L.T.A.	Lawn Tennis Association.
Ltd.	Limited.
L.W.M.	Low Water Mark.
M.	Monsieur; Member; *mile*, ; 100 (Roman Numerals).
M.A.	Master of Arts.
Maj-Gen.	Major-General.
Math.	Mathematics; Mathematical.
M.B.	Bachelor of Medicine.
M.B.B.S.	Bachelor of Medicine and Bachelor of Surgery.
M.C.	Military Cross: Municipal Commissioner.
M.C.A.	Member of Constituent Assembly.
M.Com.	Master of Commerce.
M.D.	*Medicinae Doctor* ; Doctor of Medicine; Mentally Deficient.
M.D.S.	Master of Dental Surgery.
M.E.	Mining Engineer.
M.E.D.O.	Middle East Defence Organisation.
Mem. Memo	*Memento*; Memorandum.
M.E.N.A.	Middle East News Agency.
M.E.S.	Military Engineering Service.
Misc.	Miscellaneous.
Messrs.	*Messieurs*, Sirs, Gentlemen.
M.G.	Machine-Gun.
M.G.C.	Machine-Gun Corps.

M.G.O.S.	Master-General of Ordnance Supply.
M.I.	Mounted Infantry.
M.I.Mar.E	Member of the Institute of Marine Engineers.
M.I.J.	Member of the Institute of Journalists.
Mil.	Military.
Mike.	Microphone.
Misc.	Miscellaneous.
M.B.	Measurement Book.
M.L.	Martial Law.
M.L.A.	Member of the Legislative Assembly.
M.L.C.	Member of the Legislative Council.
M.Litt.	Master of Literature.
M.L.F.	Multilateral Nuclear Force.
M.L.R.	Military Leave Rules; Martial Law Regulations.
MM.	*Messieurs*; Sirs, Gentlemen (Fr.).
M.M.	(Their) Majesties; Military Medal, Martyrs; Mint Master.
mm.	Milimeters; Mint Marks.
Mme.	*Madame* ; Mrs. (Fr.)
M.O.	Medical Officer; Mass Observation; Money Order.
M.O.H.	Medical Officer of Health.
M.O.I.	Ministry of Information.
M.P.	Member of Parliament; Military Police; (U.S. Municipal Police; Metropolitan Police.
M.P.A.	Member of Provincial Assembly.
m.p.g.	Miles per gallon.
m.p.h.	Miles per hour.
M.P.M.L.	Manual of Pakistan Military Law.
M.P.S.	Member of the Philological or Pharmaceutical Society.
Mr.	Mister.
Mrs.	Mistress.
M.R.A.	Moral Rearmament Assembly.
M.R.A.S.	Member of the Royal Asiatic Society, or of the Royal Academy of Sciences.
M.R.C.P.	Member of the Royal College of Physicians.
M.R.C.S.	Member of the Royal College of Surgeons.
M.R.C.V.S.	Member of the Royal College of Veterinary Surgeons.
m.s.	Months (after) sight.

M.S.	Master of Surgery.
M/s.	Messrs.
MS.; MSS.	Manuscript; Manuscripts.
M.Sc.	Master of Science.
M.Sc. Tech.	Master of Science of Technology.
m.s.l.	Mean sea-level.
M.T.	Mechanical Transport.
M.T.B.	Motor Torpedo Boat.
Mt.	Mountain.
Mus. B.	Bachelor of Music.
Mus. D.	Doctor of Music.
M.V.	Motor Vessel.
M.W.N.	Muslim World News (Agency).
Myth.	Mythology.
M.Y.O.	Muslim Youth Organization.
N.	North; Northern; Nitrogen.
n.	Noon; Neuter; Name.
N.A.	National Assembly.
N.A.A.F.I.	Naval, Army and Air Force Instit· tes.
N.A.P.	North Atlantic Pact.; National Awami Party (defunct).
N.A.P.T.	National Association for Prevention of Tuberculosis.
N.A.S.	Nursing Auxiliary Service.
N.A.T.C.	North Atlantic Treaty Council.
N.A.T.O.	North Atlantic Treaty Organization.
nav.	Naval; Navigation.
n.b.	No Ball (in cricket).
N.B.	*nota bene:* note well; or take notice; North Britain; North British; New Brunswick.
N.B.C.	National Broadcasting Corpn. (U.S.A.).
N.C.O.	Non-Commissioned Officer.
n.d.	No date; not dated.
N.D.F.	National Democratic Front.
N.E.	North-East; New England.
N.E.C.	National Economic Council.
nem.con.	*Nemine colradicente:* no one contradicting.
nem.diss.	*Nemine dissentiente:* no one dissenting.
N.E.P.	New Economic Policy.
Net.Nett.	Free from all deductions (*Netto*).
N.H.	Nishan-i-Haider.

N.Hqs.	Naval Headquarters.
N.I.P.A.	National Institute of Public Administration.
N.I.T.	National Investment Trust.
N.K. V.D.	People's Commissariat for Internal Affairs (U.S.S.R.).
N.-N.E.	North-north-east.
N.N.W.	North-north-west.
No.	*Numero:* number.
Nov.	November.
N.P.	Nishan-i-Pakistan; Notary Public; New Providence; No Place.
n.p.	New paragraph.
N. & O.	Notes and Queries.
N.R.	National Register.
N.R.A.	National Rifle Association.
n.s.	Not sufficient; Not specified.
N.S.C.	National Shipping Corporation.
N.T.	New Testament.
n.u.	Name unknown.
N.U.J.	National Union of Journalists.
N.U.T.	National Union of Teachers.
N.W.	North-West.
N.W.R.	North-Western-Railway.
O.	Oxygen.
o/a	On account of.
O.A.U.	Organisation for African Unity.
Ob.	*Obiit*, Died.
O.B.E.	Officer of the Most Excellent Order of the British Empire.
Obs.	Obsolete; Observation.
Obl.	Oblique; Oblong.
O.C.	Officer Commanding.
oc.	Ocean.
Oct.	October.
O.E.E.C.	Organisation for European Economic Co-operation.
O.G.D.C.	Oil and Gas Development Corporation.
O.G.L.	Open General Licence.
O.G.P.U.	Initials of Russian words, meaning United States Political Administration.
O.I.I.	Office of International Information.

O.K.	All Correct (slang term 'Orl Krekt').
O.M.	Order of Merit; Old Measurement.
%	Per cent; in the hundred.
O.Rs.	Other Ranks (in Armed Services).
O.P.	Observation Post.
o.p.	Out of print.
O.P.S.S.	On Pakistan State Service.
o.s.p.	*Obiit sene prole:* Died without issue.
O.T.	Old Testament.
O.T.S.	Officers' Training School.
O.T.C.	Officers' Training Corps.
O.U.P.	Oxford University Press.
Oxf.	Oxford.
Oxon.	Of Oxford.
oz.	Ounce.
P.A.	Press Association; Personal Assistant; Pakistan Artillery.
P.A.A.	Pakistan Army Act; Pan American Airways.
P.A.C.	Pakistan Armoured Corps; Press Advisory Committee; Public Accounts Committee; Provincial Advisory Council.
P.A.C.S.	Pakistan Association for the Cultivation of Sciences.
P.A. & A.S.	Pakistan Audit and Accounts Service.
P.A.O.C.	Pakistan Army Ordnance Corps.
P.A.F.	Pakistan Air Force.
P.A.S. Board	Pakistan Armed Services Board.
Par.	Paragraph; Parallel.
P.A.S.C.	Pakistan Army Supply Corps.
Pass.	Passive.
P.C.	Privy Councillor; Police Constable.
p.c.	Post-card; *per centum* ; by the hundred.
P.C.E.	Pakistan Council of Editors.
Pd.	Paid.
P.E.	Pakistan Engineers.
P.E.M.E.	Pakistan Electrical & Mechanical Engineer.
P.E.N. (club)	Poets, Playwrights, Essayists, Editors and Novelists.
Ph. B.	*Philosophiae Baccalaureus:* Bachelor of Philosophy.
Ph.D.	*Philosophiae Doctor:* Doctor of Philosophy.

Phys.	Physics; Physiology; Physician.
Pl.	Place; Plural.
P.F.U.J.	Pakistan Federal Union of Journalists.
P.I.A.	Pakistan International Airlines.
P.I.D.	Press Information Department.
P.I.D.C.	Pakistan Industrial Development Corporation
P.I.I.A.	Pakistan Institute of Industrial Accountants.
P.M.	Prime Minister; Police Magistrate; Provost Marshal; Post Master, Post Mortem: (after death).
p.m.	*Post meridiem*; (Afternoon, as 1 p.m.). *Post mortem*; after death examination of the dead body for ascertaining the cause of death).
P.M.A.	Pakistan Military Academy; Pakistan Medical Association.
P.M.G.	Postmaster-General.
P.M.L.	Pakistan Muslim League.
P.M.O.	Principal Medical Officer.
poet.	Poetical.
pol.	Politics
Pol. Econ.	Political Economy.
p.n.	Promissory-note.
P.N.	Pakistan Navy.
P.N.E.A.	Pakistan News Editors' Association.
P.N.E.C.	Pakistan News Editors' Council.
P.O.	Post Office; Postal Order; Petty Officer; Pilot Officer.
P. & O.	Peninsular and Orient Company.
p.o.d.	Pay on delivery.
P.O.W.	Prisoner of War.
P.O.Ws.	Prisoners of War.
pp.	Pages.
P.P.A.	Pakistan Press Association.
P.P.P. or 3Ps.	Patronise Pakistan Products; People's Progressive Party.
P.P.S.	Post Postscript; Pakistan Police Service.
P.P.S.C.	Pakistan Public Service Commission.
P.R.A.	President of the Royal Academy.
Pres.	President.
P.I.F.	Pakistan Industries Fair.
Prob.	Probationer; Problem.

PRODA	Public Representative Officers' Disqualification Act.
P.r.n.	*Pro re nata:* for special business arising.
Prof.	Professor.
Pro. tem.	*Pro tempore:* for the time being.
Prov.	Proverb.
Prox.	*Proximo:* next.
P.R.	Passage Regulations.
P.R.V.C.	Pakistan Reserve Veterinary Corps.
P.S.	*Post Scriptum:* Postscript, written afterwards.
P.S.T.	Pakistan Standard Time.
P.T.	Physical Training; Pupil Teacher.
P.T.I.	Press Trust of India.
P.T.O.	Please Turn Over.
P.T.U.F.	Pakistan Trade Union Federation.
P.W.A.	Progressive Writers' Association.
P.W.D.	Public Works Department.
P.W.N.G.	Pakistan Women's National Guard.
P.W.R.	Pakistan Western Railway Reconstruction.
P.W.V.S.	Pakistan Women's Volunteer Service.
pwt.	Pennyweight.
Q.	Queen ; Question.
Q.A.S.	Quntas Air Services.
Q.E.A.	Quntas Air Empire Airways.
q.e.	*Quod est:* which is.
q.e.d.	*Quod erat Demonstrandum:* which was to be proved.
q.e.f.	*Quod erat faciendum:* which was to be done.
Q.M.G.	Quartermaster-General.
Q.M.S.	Quartermaster Sergeant.
quot.	Quotation.
q.v.	*Quod vide:* which see, *quantum vis:* as much as you will.
R.A.	Royal Academy; Royal Artillery; Registered Accountant; Rear-Admiral.
Radar	Radio Detection and Ranging.
R.A.F.O.	Reserve of Air Force Officers
R.C.	Roman Catholic; Red Cross.
R.C.A.	Radio Corporation of America.
R.C.D.	Regional Co-operation for Development.
Rear Adm.	Rear-Admiral.

recd.	Received.
Rect.	Rector; Rectory; Rectangle.
Regt.	Regiment.
Res.	Reserve; Resigned.
Rev.	Reverend; Revise; Revision; Reve ation
r.h.	right hand.
R.I.L.U.	Red International Labour Unions.
R.I.P.	*Requiescat in pace*—May he (or she) rest in peace.
R.L.A.	Remembrancer of Legal Affairs.
R.M.S.	Railway Mail Service.
Rs., P.	Rupees, Paisa.
R.S.O.	Railway Sorting Office; Railway Sub-Office.
R.S.S.S.	Rashtriya Swayam Sewak Sangh.
R.S.V.P.	*Respondez s'il vous plait* (Fr.): reply, if you please.
Rs.	Rupees.
R.T.C.	Round Table Conference.
R.T.O.	Railway Transport Officer.
R.T.R.	Remittance Transfer Receipt.
Rtd.	Retired.
Rt. Hon.	Right Honourable.
Rly.	Railway.
S.	South; Saint; Second; Society; Sun.
S.A.	*Sturm-Abteilung* (Ger.) Storm Troops, Nazi Party; Army; Salvation Army.
S.A.A.	Small Arms Ammunition.
S.A.S.	Scandinavian Airlines System; Sub-Assistant Surgeon; Subordinate Accounts Service.
Sat.	Saturday.
S.B.A.	Sick Berth Attendant.
S.B.A.C.	Society of British Aircraft Constructors.
s.c.	Small capitals (in printing).
Sc. B.	Bachelor of Science (also B.Sc.).
Sc.D.	Doctor of Science (also D.Sc.).
Script.	Scripture.
s.d.	*Sine die:* for an indefinite period.
S.D.O.	Sub-Divisional Officer.
S.E.	South-East; Superintending Engineer.
S.E.A.C.	South-East Asia Command.
S.E.A.D.O.	South-East Asian Defence Organization.

S.E.A.T.O.	South-East Asian Treaty Organization.
Sec., Secy.	Secretary.
sec.	Second; section.
Seq.	*Sequentes* or *Sequentia:* the following.
Sen.	Senior; Senator.
Sep., Sept.	September.
Serget.	Sergeant.
S.G.	Solicitor-General.
s.g.	Specific gravity.
Sgt.	Sergeant.
Sh. s.	Shilling.
S.H.A.P.E.	Supreme Headquarters of Allied Powers in Europe.
S.J.	Sitara-i-Jurat.
S.L.	Squadron Leader; Solicitor-at-Law.
S.I.P.	*Sine legiima prole:* without lawful issue.
s.m.p.	*Sine mascula prole*; without male issue.
S.O.	Staff Officer.
S.O.S.	Save our souls (wireless appeal).
sov. (s)	Sovereign; Sovereigns.
s.p.	*Sine Prole:* without issue.
S.P.	Superintendent of Police.
S.P.C.A.	Society for the Prevention of Cruelty to Animals.
S.P.C.C.	Society for the Prevention of Cruelty to Children.
S.P.S.K.	Society for Promoting Scientific Knowledge.
S.P.Q.R.	*Senatus Populusque Ramanous:* the Senate and People of Rome: small profits and quick returns.
S.P.R.	Society for Physical Research.
Spr.	Sapper.
S.q.	Square; *sequens:* the folllowing.
Sr.	Senior; Sir
S.R.P.	Socialist Republican Party.
S.R.S.	Scales of Ration and Supply.
S.S.	Steamship; Screw Steamer.
S.S.	*Schutz-Staffel* (Ger.) Protective Squadron, a branch of the Nazi Party Army.
S.S.M.	Staff Sergeant-Major.
S.S.R.	Soviet Socialist Republic.
St.	Street; Saint; Strait.
Stet.	Let it remain.

Subs.	Submarines.
Supdt.	Superintendent.
S.W.	South-west.
S.W.A.	Spinners and Weavers' Association.
Syn.	Synonym; Synonymous.
T.A.	Territorial Army; Travelling Allowance.
T.B.	Tuberculosis; Torpedo Boat.
T.B.D.	Torpedo Boat Destroyer.
T.C.	Tank Crops; Tehsil or Thana Council.
T.C.A.	Trans-Canadian Airlines.
tech.	Technically; Technology.
temp.	Temperature; Temporary Temporal; tempore; in the time of.
T.D.	Tamgha-i-Difah, Tashkent Declaration.
T.F.	Territorial Force.
T.J.B.	Tamgha-i-Basalat.
T.J.	Tamgha-i-Jurat.
T.K.	Tamgha-i-Khidmat.
T.M.O.	Telegraphic Money Order.
T.O.	Telegraph Office; Turn over; Treasury Office; Transport Office.
T.Q.A.	Tamgha Quaid-i-Azam.
Tr.	Transpose; Transaction; Translator; Trustee.
T.R.	Tank Regiment.
T.S.F.S.R.	Trans-Caucasian Socialist Federated Soviet Republic.
T.S.M.	Troop Sergeant-Major.
T.T.	Telegraphic Transfers; Tribal Territory; Theology Teacher.
T.T.C.	Travelling Ticket Checker.
T.T.E.	Travelling Ticket Examiner.
T.U.C.	Trade Union Congress or Committee.
Tues.	Tuesday.
T.V.	Television.
T.W.A.	Trans-World Airlines.
U.A.R.	United Arab Republic.
U.C.	Union Council or Committee.
U.K.	United Kingdom.
U.K.C.C.	United Kingdom Commercial Corporation (operating in the Middle East).
U.L.	Untouched List.

Ult.	*Ultimo*; last.
Univ.	University.
U.N.	United Nations.
U.N.A.C.	United Nations Appeal for Children.
U.N.C.I.	United Nations Commission for Indonesia.
U.N.C.I.P.	United Nations Commission for India and Pakistan.
U.N.C.U.R.K.	United Nations Commission for the Unification and Rehabilitation of Korea.
U.N.D.P.	United Nations Development Programme.
U.N.E.C.A.F.E.	United Nations Economic Commission for Asia and the Far East.
U.N.E.D.A.	United Nations Economic and Development Administration.
U.N.E.E.C.	United Nations Economic and Employment Commission.
U.N.E.S.C.	United Nations Economic and Social Council.
U.N.E.S.C.O.	United Nations Educational, Scientific and Cultural Organisation.
U.N.I.C.E.F.	United Nations International Children's Emergency Fund.
U.N.O.	United Nations Organisation.
U.N.R.R.A.	United Nations Relief and Rehabilitation Administration.
U.N.S.C.C.R.	United Nations Scientific Conference on the Conservation of Resources.
U.N.T.C.	United Nations Trusteeship Council.
U.P.	The United Provinces (of India now called Utter Pradesh); United Presbyterian.
U.P.A.	United Press of America.
U.P.I.	United Press of India.
U.P.U.	University Postal Union.
u.s.	*Ut supra*; as above.
U.S.	United States.
U.S.A.	The United States of America. United States Army.
U.S.A.A.F.	United States Army Air Force.
U.S.I.	United States of Indonesia.
U.S.I.S.	United States Information Service.
U.S.S.R.	Union of Soviet Socialist Republics (Russia).
U.T.C.	University Training Corps.

U.O.T.C.	University Officers, Training Corps.
v., vs.	verb, *versus:* agai st.
Varsity.	University.
V.C.	Victoria Cross; Vice-Chancellor; Vice-Chairman.
Vet.	Veterinary.
Viz.	*Videlicei:* namely.
Vol.	Volume.
V.C.	Vice-Chancellor.
V.I.P.	Very Important Person.
V.O.A.	Voice of America.
V.P.	Vice-President.
V.P.P.	Value Payable Post.
V.S.	Ve erinary Surgeon.
W.A.A.C.	Women's Auxiliary Army Corps.
W.A.A.F.S.	Women's Auxiliary Air Force Services.
W.A.F.S.	Women's Auxiliary Fire Services.
W.A.P.D.A.	Water and Power Development Authority.
W.A.Y.	World Assembly of Youth.
W.D.	War Department; Works Department.
W.F.G.	World Federal Government.
W.F.T.U.	World Federation of Trade Unions.
W.H.O.	World Health Organisation (U.N.O.).
W.I.E.	Women's International Exposition.
W.L.A.	Women's Land Army.
W.M.C.	World Muslim Conference.
W.P.B	Waste Paper Basket.
W.P.I.D.C.	West Pak Industrial Development Corporation.
W.P.S.T.	W st Pakistan Standard Time.
W.O.	Warrant Officer; War Officer; Wing Officer.
W.P.	Weather Permitting.
W.R.	War Reserve; West Riding.
W.R.A.C.	Women's Royal Arms Corps.
W.R.S.S.R.	White Russia Soviet Socialist Republics.
Wt.	Weight.
W.T.	Wireless Telegraphy.
W.U.S.	World University Service.
W.V.S.	Women's Voluntary Service.
X'mas	Christmas.
Y.M.C.A.	Young Men's Christian Association.
Y.M.M.A.	Young Men's Muslim Association.
Y.W.C.A.	Young Women's Christian Association.

FOREIGN WORDS AND PHRASES

F., Fr.=French. L.=Latin. Ger.=German.
G.=Greek. It.=Italian.

ab ante (L.), from before.
ab extra (L.), from wihout.
ab initio (L.), from the beginning.
ab intra (L.), from within.
ab origine (L.), from the origin and beginning.
ab ovo (L.), from the egg; from the beginning.
a compte (F.), on account; in part payment.
a finem (L.), to the end; towards the end.
ad hoc (L.), for this (object).
ad idem (L.), to the same (point).
ad infinitum (L.), to infinity.
ad interim (L.), for the meantime.
ad libitum (L.), at pleasure.
ad referendum (L.), to be further considered.
ad valorem (L.), according to value.
agent provocateur (F.), a government agent employed in provoking disorder so that the government may find a pretext for repression, a spy who, professing sympathy, eggs on his victims.
aide (Fr.), an assistant, a helper, a mate.
ala bonne heure (F.), in good or favourable time; very good.
ala mode (F.), in the fashion, according to the custom.
alibi (L.), plea that when the alleged act took place the accused was elsewhere.
alma (It.), soul, essence.
alma mater (L.), begin mother—applied by old students to their college or university.
alter ego (L.), one's another self, a friend, a representative.
amicus curie (L.), a friend in court.
amor vincit omnia (L.), love conquers all things.
amour propre (F.), self-love, vanity.

ancient regime (F.), the old order of things.
anno domini (L.), in the year of our Lord.
anno mundi (L.), in the year of the world.
anti bellum (L.), before the war.
anti meridiem (L.), before noon (a.m.)
apologia (G.), an apologetic writing.
apropos (Fr.), to the purpose, in respect of.
argent comptant (Fr.), ready-money.
arriere pense (Fr.), mental reservation; ulterior motive.
a salti (Fr.), by fits and starts.
au fait (Fr.), well acquainted with a matter; expert.
auf wider sehen (Ger.), till we meet again, good-bye!
au revoir (Fr.), adieu: till we meet again.
axiom (L.), generalisation.
beau jour (Fr.), good day; fine day.
bene vobis (L.), health to you.
bene venuto (It.), welcome.
bete (Fr.), brute, stupid person
betise (Fr.), stupid remark or action.
banne bouche (Fr.), a choice morsel.
bona fide (L.), in good faith, genuine, genuinely.
bon vivant (Fr.), a jovial companion, one who lives too well.
bon voyage (Fr.), a good journey to you.
bourgeois (Fr.), of the middle class.
bravo (It.), well done.
cadre (Fr.), a list of officers; a scheme, a frame.
casus belli (L.), whatever involves or justifies war.
caveat emptor (L.), let the buyer take the risk.
centum (L.), a hundred.
ci-devant (Fr.), former, formerly, heretofore.
comme il faut (Fr.), as it should be, correct.
commune bonum (L.), common good.
compos mentio (L.), of sound mind, sane.
compte rendu (Fr.), account rendered, report.
con-amore (It.), lovingly.
con spirito (It.), with spirit.
contra (L.), conversely.
coup d'etat (Fr.), violent or sudden change in government.
coup de grace (Fr.), finishing stroke.
coup de main (Fr.), sudden violent attack.
crux (L.) a puzzle.

cuibono (L.), for whose benefit is it? Who is the gainer?
de facto (Fr.), in fact: really.
degage (Fr.), easy, unrestrained.
dei gratia (L.), by the grace of God.
deo gratia (L.), thank God.
de jure (L.), a legal right; in law.
de nove (Fr.), anew.
detenu (Fr.), a prisoner, a person detained in custody (on political grounds).
de trop (Fr.) wanted; too much; superfluous.
dichtung and wahrheit (Ger.), fiction and truth.
deiu et mon droit (Fr.), God and my right hand.
double entente (Fr.), two meanings.
elite (Fr.), choice; select.
eisen and blut (Ger.), blood and iron, a famous phrase of Bismark.
en bloc (Fr.), as a whole; in a body.
en masse (Fr.), all together.
en paseant (Fr.), in passing, by the way.
entente cordiale (Fr.), cordial understanding.
en route (Fr.), on the road; let us go; march.
en tout (Fr.), wholly, in all.
entire nous (Fr.), between ourselves.
erratum (L.), error.
et cetera (L.), and others.
et seq (L.), and the following.
euraka (G.), I have found it.
exampli gratia (*e.g.*), (L.), by way of example; for instance.
ex-officio (L.), by virtue of his office.
ex-parte (L.), on one side, as a partisan.
ex-tempore (L.), without premeditation
fait accompli (F), things already achieved.
faux pas (F.), a false step; mistake.
felo da se (L), self-murder, suicide.
festima lente (L.), hasten gently.
flagrante delicto (L.), in the very act.
flair (Fr.), scent; keen sense of smell.
franco (L.), post free franked.
fraus pia (L.), a pious fraud.
grande passion (F.), grand passion, a serious love-affair.
hic jaect (L.), here lies.

hoc tempore (L.), at this time.
ibidem ibid (L.), in the same place.
idem (L.), the same.
id est (*i.e.*) (L.), that is.
indee fixe (Fr.), fixed idea.
impasse (Fr.), deadlock.
in camera (L.), in a (judge's private) room.
incognito (L.), unknown.
in extenso (L.), in full length.
in extremis (L.), at the point of death.
in flagrante delicto (L.), red-handed, while committing crime.
infra dignitatem (Fr.), below one's dignity.
in situ (L.), in its original situation.
in status quo (L.), in the former state.
in tempore (L.), in the meantime.
inter se (L.), amongst themselves.
inter alia (L.), among other things.
in toto (L.), completely, on the whole, entirely.
in transitu (L.), on the passage.
ipso facto (L.), by the very fact, in the fact itself, virtually.
jeud' esprit (L.), witty or humorous trifle, a witticism.
l' allegro (It.), the merry, cheerful man.
laissez-faire (Fr.), absence of restraint.
lingua franca (It.), national language.
locus standi (L.), a place for standing, a right to interfere.
magnum bonum (L.), a great good.
magnum opus (L.), a masterpiece, a great work.
mala fide (L.), with bad faith, treacherously.
mala propos (Fr.), ill-timed.
mare liberum (L.), an open sea.
marriage de convenance (Fr.), marriage from interest rather than love.
materia medica (L.), medicine collectively, all substances used as remedies.
mauvais sujest (Fr.), a worthless fellow.
meiee (Fr.), a confused scuffle, hot debate.
mesalliance (Fr.), a lowering marriage.
memento mori (L.), Remember that you must die.
mens sana in corpore sano (L.), a sound mind in a sound body.
mensem (L.), month.
modus operandi (L.), mode of operation, mode of working.

mutatis mutandis (L.), with necessary changes in details.
monsieur (Fr.), Sir, Mr.
mot juste (Fr.), exactly the right word.
naissane (Fr.), birth.
nem con (L.), no one contradicting, without opposition.
ne plus ultra (L.), farthest point attainable, culmination.
noblesse oblige (Fr.), rank imposes obligation.
non possumus (L.), absolute refusal.
non sequitur (L.), it does not follow.
nota bene (*N.B.*) (L.), mark well, notice.
nous verrans (Fr.), we shall see.
noveaux riches (Fr.), persons who have but lately acquired wealth, upstarts.
par excellence (Fr.), eminently, extreme excellence:
pari passu (L.), with equal pace: together.
per (L.), by; by means of.
per capita (L.), by the head.
per diem, per mensem (L.), daily, monthly.
per sonne (Fr.), the persons employed in any service.
per saltum (L.), by a leap or jump.
per se (L.), by or in itself, intrinsically.
persona grata (L.), acceptable person.
pis aller (Fr.), last resource: the last or worst shift.
post meridiem (*p.m.*) (L.), afternoon.
post mortem (L.), after death; (medical examination after death).
prima facie (L.), on the first view, first sight.
prima donna (It.), the chief female singer in an opera.
pro forma (L.), as a matter of form.
pro patria (L.), for our country.
pro rata (L.), at the same rate; proportionally.
pro tempore (L.), for the time being.
quod erat demonstrandum (*Q.E.D.*) (L.), which was to be proved or demonstrated.
quod erat faciendum (*Q.E.F.*) (L.), which was to be done.
quod vide (L.), which see.
raison d'etre (Fr.), reason for thing's existence.
response s'li vois plaint (R.S.V.P.) (Fr.), reply if you please.
resume (Fr.), an abstract or summary.
sans frais (Fr.), without phrases (of courtesy); without formalities.
seriatim (L.), serially.

sic (L.), so.
sine die (L.), without naming a day; for an indefinite period.
sine qua non (L.), an indispensable condition.
soi disant (Fr.), self-styled; pretended.
status quo (L.), the state in which a thing or an affair was.
stet (L.), let the deleted word stand.
sub judice (L.), under judicial consideration.
sub rosa (L.), under the rose, privately.
sui generis (L.), unique; of its own kind.
tane mieux (Fr.), so much the better.
tant pis (Fr.), so much the worse.
tete a tete (Fr.), confidential, private conversation.
tour de force (Fr.), feat of strength or skill.
ubibue (L.), everywhere.
ultimo (L.), the last.
ut infra (L.), as below.
ut supra (L.), as above.
ultra vires (L.), beyond one's powers, against law.
vade mecum (L.), go with me, a constant companion.
vale (L.), farewell.
verbatim (L.), word for word.
versus (L.), against.
via media (L.), a middle course.
vice (L.), in the place of.
vice versa (L.), in the reverse order.
videlicet (*viz*) (L.), namely.
vis-a-vis (Fr.), opposite, facing.
viva voce (L.), oral, orally.
vox populi, vax dei (L.), voice of the people is the voice of God.
zeitgeist (Ger.), spirit (and tendency) of the times.

PART XI

INTERVIEWS

INTERVIEWS

More can be learnt about a person in a brief interview than through his answer books on different subjects. An article of interest can better be judged at a glance than through statement of its qualifications in its absence. A judgement can easily be formed at an interview because it calls forth all the faculties of human personality and as such is more significant and revealing than the written test. One may be extraordinarily successful in answering written questions but may not be desirable otherwise.

The interview has become an essential part of every important competitive examination. After written papers have been valued, interviews of a certain number of topmost successful candidates are held to decide finally about their fate. *Viva Voce* or oral tests also form a part of regular examinations conducted by the Academic Body of the University of Oxford. *Viva Voce* discloses candidate's mental alertness, initiative, self-confidence, etc.

Importance of interviews is very great. A successful interview of a few minutes may enable a candidate to win a decent career. It may carry him from the list of *qualified* candidates to that of *selected* candidates or even from the bottom of such a list to higher positions and ultimately to comparatively better services. On the other hand, a little bit of deficiency may turn the scales against him.

Nature of Interviews

Candidates in modern competitive interviews are generally required to be well-acquainted with current affairs, and have a fresh and clear understanding of developments in Pakistan and the world. For special services such as the Armed Forces, *i.e.*, Navy, Army and Air Force, Central Superior Services, Civil Services, etc. candidates are particularly expected to be well-acquainted with the nature and requirements of each service, as mentioned in the following pages.

A Speech. "The trials of a *viva voce* examination" was once the subject of a broadcast talk by Sir T. Vijaya-raghava-charya who had been a member of the Federal Public Service Commission and had to conduct several *viva voce* tests. In the course of his talk, he recalled many humorous sides of these tests.

He said, "For many years of my life I have had to conduct *viva voce* examinations, either in connection with a general educational or academical qualification or with appointments to services or the filling of specific posts in the course of which candidates had to be interviewed. Broadly speaking, there are two different purposes which a *viva voce* examiner sets before himself, and the method of examination differs according to the purpose. In one case, the object is to test the range and the accuracy of candidate's written examination and the examiner takes up the candidate's written answers and cross-examines him on them. It is the most effective method of exposing the man who has only a superficial and shallow knowledge of the subjects and tries to cover it up by pretentious phrases. I have seen the deadly effect of *viva* in such cases.

"I can recall the case of a candidate who in a written paper on Indian Finance had ventured the statement that if he was responsible for India's finances, he would reduce the military budget straightway. When it came to the *viva* he was unable to tell me what the actual size of army was; what were the various arms of which it was composed and where he would make the reduction."

The Other Method. "The second method is now the one more generally in use. It has no reference to the examinee's written answer: in fact the oral examiner is a different man from the one who examines the scripts and the object in view is not to discover the candidate's knowledge of any particular subject, which is tested by means of written papers, but *to ascertain his mental alertness, his general knowledge and intelligence and the breadth of his outlook, and to obtain an impression of the personality.* This is a harder test, both for the examiner and the examinee, and the possibilities of the examinee making a mistake are greater. Also where the *viva* is conducted not by a single examiner but by a

Board, as is now usually the case, there is room for wide variation amongst the members composing the Board."

"I have deliberately put the title of this talk as 'The trials of a *viva voce examination*' and not as 'The trials of a *viva voce examinee*' because the examiner has his trial as well as the examinee. The examiner is, of course, generally speaking, more favourably situated. Sometimes when I put a question to a candidate, which he could not answer, the more venturesome of that class have asked me what my answer was. I could always get out of it by telling them that they were there to be examined, and not I. It is, however, not wise for the examiner always to rely on the fact that he is the predominant partner in the concern."

Various Types of Examinees. "I remember, once at a *viva voce* board, one of my colleagues put a spirited young man who, when asked what was his strong point, had answered that it was English Literature, a series of questions which had no bearing on his subject. He was called upon by a member of the board to tell the quantity in inches of the rainfall in the capital of the province from which he came; then the total figures of the provincial Government's budget, the amount of revenue derived from taxation on land and the strength of the police force. The young man had to confess ignorance on every one of these. I could see his temper rising. The last straw was when he was asked the most direct route of railway which would take him from Allahabad, which was the scene of the examination, to Karachi. He replied, "If ever I have the misfortune to have to go from Allahabad to Karachi, I should consult the railway guides." The candidate was passed on to next member of the board.

"I have not come across myself the specimen of the impudent examinee who makes up for his lack of knowledge by self-assurance. I have, however, heard the story of a candidate who was asked at medical *viva voce* as to what he would do if a man was blown up by gunpowder. 'I would wait till he comes down', was the answer. The next question was 'What muscles would I put in motion if I knocked you down for so impertinent an answer.' The candidate, cool in his assurance, replied, 'The muscles of my arms, for I should knock you down in turn."

The opposite type of candidate who tries to ingratiate himself into the examiner's good grace by appealing to his vanity is also uncommon. There is, however, the well known story of a bright lad, a candidate for the Navy, who was being interviewed by a board of naval officers presided over by a full-blown admiral. One of the questions put to him was to name the six most famous admirals in English history. He duly mentioned Drake, Raleigh, Blake, Nelson and Vincent and for the sixth name he turned to the member of the board nearest to him and said, "I forget the name of the chairman of this board; could you kindly tell me, because he is the sixth?"

The trials of the examinee are naturally larger than those of the examiner but there is always the humorous side of things, and it is marvellous what the chairman of a *viva voce* board endowed with a gift of humour can do to put the candidate at ease and create an atmosphere in which the best can be drawn out of them. I recall the case of a young man who was asked which was his favourite newspaper. He named a well-known journal circulating in Northern India. In order to discover his interests, he was asked what was the first thing he turned to when he opened his paper: was it the foreign telegrams or the Indian news or the leading articles? The unexpected reply was the "advertisements." When asked for the reason for this rather uncommon preference, he said, "I am 23, I am still unmarried. My paper is full of matrimonial advertisements. That is why I see them first."

"There was, then, the candidate who had made a special study of political science. He was questioned as to why when the cabinets were being formed in England, often the gentleman chosen for the War Office was one who had probably never handled a gun in his life and the gentleman selected to be the Secretary of State for India had, probably, never been in India. The answer was that it was an ingenious device meant to keep the real power in the hands of the permanent officials. If the Minister had first-hand knowledge of his subject, he would act of his own bat."

"A third candidate was the son of a Minister in the United Provinces. He was asked what career would he take up if he did not get into the service for which he was being

examined. He said he would stand for election to the local Legislative Council. The next question was: 'What party would you join'? "It all depends on the party prospects at the time. I shall join that party which is likely to command the majority in the Council."

There are, of course, the cases of unsophisticated young men who return answers in pure ignorance. Geography is often a stumbling block and I gathered at a recent visit to educational institutions in England that the subject is not more popular there than it is in India. I asked a candidate for one of the All-India Services what Pusa was noted for. He answered: "For its leaning tower," an answer which though incorrect at the time, was justified five years later by great Bihar earthquake."

"Another was asked to say what 'isobars' were. He thought for a few minutes and then the English habit of making a compound word out of the first syllable of one name and the last syllable of another name, exemplified in the contraction of the Montagu-Chelmsford Report into the 'Montford' reports, suggested to him the answer: 'Larger masses of ice from the Polar region, drifting to the Nicobar Islands.' It was needless to remind the intelligent listener—in that isobar lines on a map of the world are lines denoting equal degrees of atmospheric pressure."

Importance of Interview

Interview plays a very important part in the selection of persons for various services. In certain cases even preliminary interviews are held in order to select *prima facie* suitable candidates who are allowed to appear in the written examination. The final *viva voce* is held again in the case of those who obtain a prescribed percentage of marks in the written test. This procedure is followed for selecting candidates for the Emergency or Regular Commission in the Land, Naval or Air Force.

The interviewing board has before them a fairly accurate picture of a candidate as revealed from his academic record, character certificates and other testimonials. He is asked questions on *matters of general interest*. The object of the interview is to assess his suitability for the service for which he

has applied, and in forming their assessment, the board attach particular importance to his *intelligence and alertness, his vigour and strength of character and his potential qualities for leadership*. It should be remembered that candidates have to attain the very highest standards in order to get into an administrative service or to get Commission in the Forces and it is through interview that a test of the personality and character is conducted to make quite sure that those admitted to such services are indeed the elite of the nation; mere factual knowledge and formal education are by no means sufficient to secure admission.

Rules for the Public Service Interviews

It is most essential at these interviews for the candidate to be thoroughly conversant with the particular line of profession for which he is applying. Generally speaking, the following are the four rules for the interviewed appearing before the Public Service Commission:—

He should:—

(*i*) Grasp the significance of the question.

(*ii*) Make the answer impressive, but brief.

(*iii*) Be convincing.

(*iv*) Be direct.

Preparation for Interview

Preparation for an interview to be conducted by the Public Service Commission should be systematic and regular. It should begin at the same time as the ordinary studies connected with the written papers. The candidate should set aside one hour for special training, once a week, on an average, for at least one year prior to appearing in a competitive examination.

Dress. Dress reveals personality of a man more than most things. Shakespeare said, "The apparel oft proclaims the man." This is more than true. Some candidates, however have the impression that it is their dress that is going to win the day for them in their interview. No doubt a well dressed

man has an initial advantage over the ill-dressed. But it should be remembered that a brand new suit, a brand new costly pair of shoes, a first class wrist watch are by no means the absolute necessities for an interview. You should be long used to the type of dress chosen for your interview. It is unwise to go on all along in a *shalwar* and to put on for the first time an English suit on the day of interview. Do not have a brand new costly suit for the interview day. Put on some good suit which has been used a little and which fits and settles on you comfortably. Again, brand new pair of shoes should never be used on the day of interview. You must be using it for some time so that you may walk comfortably in it. If you are not used to glasses, do not use them that day. Tugging a flower in a buttonhole or keeping a bright-coloured kerchief out in your upper pocket, is not funny but exhibits a childish taste.

Shake off Fear. Many a candidate has failed to get into service simply because he could not come up to the mark in the *viva voce* test. The main cause of his failure has always been the fear of the Interview Board. It should be remembered well that "prosperity cannot be built on fear." A candidate should have courage, cool-headedness, and, above all, self-confidence to face the whole situation.

You may know the joy of skating off on a cold day. You may know the delight of a fine meal after a long walk. These are real and wholesome but all such things put together cannot approach the thrill of ridding yourself of fear. The conquest of fear is one continuous, grand and glorious feeling. It is equally easy—and equally dangerous—to become a martyr to one's own fear. It must be shaken off. Have courage, cheerfulness and self-confidence in you and success is sure.

Essential Qualities for Success in an Interview

The following are some of the most essential qualities which a candidate should possess in order to do well in an interview.

1. *Speech.* In order to be a successful officer you should develop power of speech clearly, correctly and fluently. You must pick up the sense of a question, and reply it to the point

in correct pronunciation, listen to talk on B.B.C. very frequently, and if possible mix up with some English friends.

Remember that you must not take to affectation in your pronunciation when appearing for an interview before a board. Be natural in your speech.

2. *Common-sense and General Knowledge.* You must have great common-sense and general knowledge to succeed in an interview. You must devote sufficient time to acquire these qualities. You must be a well-read man and knowing fundamentals of every subject—Physical Sciences, Geography, Politics, Current Affairs, Philosophy, Psychology, History, General Economics, Civics, English Literature, Sports, etc.

But in spite of your best efforts, you cannot know every aspect of every subject. A member of the interview board may put you a question which you cannot answer. You need not be nervous at such a time, nor should you try to bluff the examiner. Be honest and say that you do not know the answer. It is much better to admit your ignorance, rather than try to bluff or give an incorrect answer and thus create a bad impression.

The policy of bluff or make-believe just does not pay in an interview. It is best to be honest with yourself as also with your interviewers. Nobody is expected to know everything and it is childish to play the moving encyclopaedia. It is equally useless to try to look over-smart. The game of bluff, not infrequently resorted to by many a candidate, is fatal. It must be borne in mind that the members of the Commission who sit in judgment on you are scholars of repute, they have studied and thought over the questions they put to you. They are familiar with every minute detail of the information you give them. Moreover, they are experienced and have known your species and all its richness and variety.

This reminds the writer of an interesting experience of one of the co-opted members of the Federal Public Service Commission of whole India. Dr. L. C. Jain was Professor of Economics, University of the Panjab. The Professor in the course of an after-dinner speech told the story of interview of an over-smart Civil Service candidate who incidentally had informed the Commission that his special subject of study was

Agricultural Economics. Lord Linlithgow had, in those days, just taken over as the Governor-General and during the early days of his regime, his Excellency felt greatly interested in rural uplift measures. Apart from other things, his Excellency was trying to have healthy and rich milch-cow through a special technique of cross-breeding. Hissar bulls in that connection had become fairly popular.

The candidate was asked as to what he thought of the measures that the Viceroy was taking with regard to improving the quality of the milch-cow. The smart and ready reply was to the effect that "Viceroy was doing his very best to encourage cattle-lifting in India and that his Excellency was the greatest cattle-lifter of all in the entire sub-continent"! The candidates are warned against ejaculating over-smart replies of this type. What is needed is sobriety and confidence in the candidate.

3. *Funny Questions.* Sometimes very funny questions are asked of the candidates. You should not lose your presence of mind in such a situation but give answer in the spirit in which a question has been asked. If you are resourceful and clever you may give a proper and respectful answer and thus carry the day.

4. *Know the People and Your Country.* You should travel as much as possible, see big cities of your country and if possible go abroad. Travelling widens outlook and by coming in contact with people of different places and countries, you learn much about their ways of living, which cannot be known otherwise. Quite often, questions are asked from candidates which can be answered properly only if they have travelled widely.

5. *Social Personality.* It is essential that you must have a social personality to do well in an interview conducted by a Service Commission. Mixing with all sorts of people, hearing lawyers in law-courts, listening to debates in assemblies and attending big social functions definitely go a long way to teach you the essentials of social life.

6. Last, but not the least, you must not be nervous. Do not have any fear of the interviewer. Have courage and

self-confidence. Remember you develop all these qualities—particularly full self-confidence—nothing will stand in your way and success will be yours.

The C.S.S.P. Interview

The interviews conducted by the Pakistan Public Service Commission for the selection of candidates for the Central Superior Services of Pakistan is the most important of all the interviews conducted by the Commission. It is important for the candidates and equally important for the country's safe, wise and just administration which will depend considerably on the right choice of interviewer.

The Commission fixes a certain percentage—varying from 42 to 45—of the maximum marks of the written test as the qualifying marks for purposes of interview. The candidates who fail to get this percentage of marks are not called for an interview. The minimum qualifying marks are 100 out of 300, but there is little difference between candidates who obtain the bare qualifying marks and those whom the Board finally rejects as unsuitable. The number of candidates who obtain half marks or over varies from 30 to 35 per cent, of the candidates called for interview. Outstanding candidates are extremely few. The highest marks awarded seldom exceed 270 or 280, and four to five per cent of candidates obtain over 250. Candidates who obtain 200 marks or over are considered first class.

The above figures, which have been taken from the Commission's reports for various years, show that it is not quite easy to get first rate marks in interview unless a candidate possesses definite qualities to secure recognition from the Interview Board. Obvious qualities which he must develop are *personality*; *good manners*; *cultured speech*; *originality*; *quickness of understanding*; *initiative* and above all *a broad general knowledge*. The Board will watch for all these qualities and, apart from the last named, others will be silently noted. The candidate cannot have any indication of the standard by which he is being judged and so he must aim at the maximum impression in all. In General Knowledge his intelligence and capacity to express himself concisely and accurately, will weigh

considerably. A close study of the chief events of the day as well as of a few months preceding the day of interview is an indispensable part of the preparation. About his own record as available to the Board, he must be on his guard to avoid any misrepresentation. The Board has laid a great stress on this aspect and has pointed out that a character certificate should give full information about the activities of a candidate as known to the person writing the certificate. Otherwise, the Board is handicapped by the scant information given in the character certificates of many candidates.

A candidate should not fail to understand the psychology of the members of the Board. The chairman often judges the character of the interviewer, another member may try to form an opinion of the candidate's worth by his own decade-old standard, slightly intermingled with present-day standards of judgment. Such an interviewer is very tough and great care must be exercised in answering his questions. The third member might have religious leanings and ask questions concerning Islam *vis-a-vis* other religions. The fourth member might be a specialist or a politician and might put questions concerning some special aspect of his subject of the importance and complication of a political event in a country. On the whole, the Central Superior Services interview requires all the latent qualities of the head and heart to justify one's suitability for this responsible post.

Civil Service of Pakistan attracts very brilliant and ambitious candidates. This service it, as a matter of fact, the backbone of a country. The British who ruled over India and other countries had the best recruits for this service. Really capable persons, cream of the country, were selected for this service. A country's safe, wise and just administration mainly depends upon its Administrative Service.

The interview of the Civil Service of Pakistan is of very exacting and searching nature. The candidate must possess certain definite qualities, *e.g.*, an impressive personality, good manners, cultured speech, originality, initiative, resourcefulness, capacity to express himself correctly, and accurately, through insight into current affairs, national and intèrnational affairs, quickness in uptakes, tactfulness, etc. The Board generally judges a candidate from these points of view. The members

of the Board are experienced people. Each member is specialised in some branch of knowledge. A candidate has, therefore, to be rather careful of his interview. It does not mean that he should feel nervous unnecessarily. But he should try to adopt "safe" attitude in answering questions. Keeping in constant touch with standard newspapers can pay much in current information.

Pakistan Foreign Service. A candidate is expected to know specially about History and Political Science. He is also required to be well-informed about the current political affairs. He should be a man of pleasing personality and engaging manners, resourceful, ready-witted, quick in mental processes as he has to handle important and delicate matters quickly. He has to move among the highest functionaries of the State. Therefore, a person of shy nature or one who suffers from inferiority or superiority complex cannot prove successful. Thus, a person of good bearing with special social and intellectual attainments is well-suited for Foreign Service.

Police Service. Strong health and physique, good sportsmanship, and a family record entitling one to special consideration for this service are some of the essentials for selection in this service. The Police Service is a strenuous one. One should be quite prepared and suitable to face the difficulties.

Forest Service. A candidate should have definitely scientific bent of mind and training. A good science degree, preferably in Botany is required; good horsemanship, physical vigour, energy, love of open air and of country-life, capacity of close observation are some of the essential qualifications and qualities of a would-be Forest Officer.

Military Services Interviews. Specific requirements for armed forces are sound physique, alertness, intelligence, initiative, uprightness and self-confidence. One should be of a hard tough nature so as to be able to bear all possible discomforts. Questions in an interview are generally of a searching nature on these points. Higher ranks of trust and responsibility can only be attained after many years of tried service. Talented youths with grit and energy can, however, rise quickly.

PART XII

PERSONALITIES

Lives of great men all remind us
We can make our lives sublime...
—Longfellow

The heights of great men reached and kept
Were not attained by sudden flight.
But they while their companions slept,
Were toiling upward in the night.
—Longfellow

PERSONALITIES

Great men of science, literature, art, renowned warriors, statesmen, reformers, builders of nations, some of God's greatest apostles have belonged to no exclusive country, class or rank in life. They have come alike from colleges, workshops, farm-houses, huts of poor men, the mansions of the rich. Sometimes the poorest have attained the highest places. Their difficulties did not prove obstacles in their way. On the other hand, in many cases those difficulties proved their best helpers by evoking their powers of labour and endurance and stimulating into life their talents which might otherwise have lain inactive.

Napoleon was an ordinary lawyer's son. Socrates was a sculptor in his early age. Abraham Lincoln was born in a poor cottage. Jinnah was the son of a merchant, Ataturk Kemal was son of a revenue collector, and while young, after his father's death, he tilled the soil and grazed the sheep of his uncle for some time. Hitler was once a carpenter in Munich, Mussolini was a blacksmith's son, Stalin was a cobbler's son. Afghani came from an obscure part of Afghanistan, Faraday was once a bookbinder, Copernicus was son of a blacksmith and Edison started life as a newsboy.

Although genius is born to be expressed just as seed is planted to grow, yet, generally, there has been no easy path to greatness. It has all along been a very difficult task to tell truth against established false conceptions and misbeliefs, to establish justice in the face of oppression, to rise against legalised tyranny and to raise a fallen nation. Great persons toil when others take rest, they awake when others sleep, they realise what others do not, they rebel against ignorance, against false beliefs, against legalised oppressions of rulers—against everything unnatural—they stand firm when others yield, they lose when others gain, and if need arises they lay down their lives where others falter. And ultimately they achieve what others do not.

They present a wide horizon and diversified spectacle in the adventure of human life. Soldiers like Alexander; explorers like Columbus; revolutionists like Afghani, Karl Marx, Garibaldi; state-builders like Kemal Ataturk, Jinnah, Sun Yat-Sen; dramatists like Shakespeare, Goethe, Shaw; poets like Iqbal; all belong to groups as varied as human endeavour. Yet all have one thing in common—the subtle essence of personality, that "perfume of heroic thought and deed" which we call fame.

Afghani, Jamaluddin (1839-1897). "Hero of Pan-Islamism", Syed Jamaluddin Afghani, son of Syed Safdar, was born at Saadabad in an obscure part of Afghanistan. Shifted to Kabul with his father. At an early age of 10, he had obtained wide knowledge of history, mathematics, medicine, etc. A youth of extraordinary ability, strength of character, had the natural gift of being impressive, had magnetic force in his eyes, reigned over the hearts of people. He would tell the truth without entertaining any fear; and had the tenacity of purpose.

The middle of the nineteenth century was a period when the Muslim world had suffered degradation. With the "mutiny" (war of Independence) of 1857 faded away the last Mughal shadow in India and a reign of terror and oppression befell the Muslims. Afghanistan which had been depending on India for centuries was coming under the direct disruptive influence of the British and internal strife was being encouraged in exercise of their policy of "divide and rule" in Iran; the British traders had established their foothold and had come to have a great influence on the administration of that country; the Turkish possessions in Europe were being liquidated on the pretext of nationality, and Turkey was reduced to a "sickman of Europe." Russian Muslims were being divided; African Muslims were being segregated on the basis of "nationality", by allowing the French to dig the Suez Canal and throwing open the subscription of capital to the world, the misfortunes of Egypt were rooted deep.

Afghani had a natural desire to serve Islam. He travelled far and wide, went to India, Arabia, Iran, Turkey, etc. His penetrating eye was finding out the real causes of the downfall of the Muslims. He felt the pulse of the falling nation; the

root cause of their degradation was their decentralization, misguidance of religious leaders, their exploitation by European Powers. He realized that Europe was dividing the Muslim world on the basis of racialism. No doubt, Muslim leaders in various countries were doing their best for the uplift of the Muslims of their respective countries, but Jamaluddin wanted the Muslims to be independent and to progress according to their resources and be united under one Caliph, so as to be able to check the aggressive Powers by their united front.

His life mission was unity of Muslims under one Caliph and prosperity of Islam. Devoted all his life in this effort. Warned the Muslim world that a flood of Europe was following and if they made no iron wall it would destroy them for ever. He started his paper *Shams-un-Nahar* in Afghanistan for that purpose, travelled far and wide: in Turkey he met Prime Minister Ali Pasha and made him realise the serious situation of the downfall of the Muslim States; started his work there, clashed with Sheikh-ul-Islam of Istanbul. Went to Egypt, Khidev Ismail was running into debt of the Western Powers, not only Suez Canal but the entire Egypt was getting out of hands. Turned out of Egypt, came to Ḥyderabad (Deccan).

In 1884 went to London and then to Paris where he started a weekly paper *Urwat-ul-Wosqa* in Arabic. In the paper he called the Muslim States to get united and aspire for power. The paper became very popular and after the publication of its 18 issues the British got alarmed about their foothold in the East, banned its entry into India and Egypt. In 1887 he went to Russia and met the Czar and got redressed some of the grievances of the Muslims; also went to Germany. Spent much time for the uplift of Iran and Turkey; died in prison in 1897. His last touching letter to a friend contained "....My body is imprisoned for the freedom of mankind. I am being killed for the life of nation, but alas! the fulfilment of my mission is not within sight...."

Afghani's Call to the Muslim World: The Christians and the Jews are the arch enemies of the East and wish to efface the Muslims from the world and deem it their duty. The European nations propagate it as their duty that the Muslim world is not capable of its protection and has no ability to reign and are trying to degrade and humiliate it in every possible

way. Sometimes they create differences, at times they bring in a trap of their European politics and sometimes they use arms. The Muslim world should beware of the Western enemies, their tactics and power. They should protect Islam, gain political strength in every possible way, unite at one centre and master their defensive resources and regain their lost prestige and make itself one of the living nations of the world.

Allama Mashraqi, Inayat Ullah Khan, M.A. (Cantab), B.Sc., B.E., B.O.L., F.R.S. (Arts), I.E.S. (Retired), F.A.S. (Paris); F.G.S. (Paris); Wrangler and Scholar. 1888—1963.

He was born at Amritsar on 25th August, 1888; son of Khan Ata Muhammad Khan, graduated with high distinction from the Forman Christian College, Lahore, at the age of 15. At the age of 16 he took M.A. (Maths.) degree from the Panjab University, breaking all previous records; joined Christ's College of Cambridge University, in 1907, defeated all colleges which competed in competitive examination of Mathematics and won the title "Foundation Scholar" and scholarship of £70 per mensem; in 1907 completed an Honours course in Mathematics in two years and won the title "Wrangler"; finished another 6 years' Honours course in two years and stood first; he took B.O.L. and B.Sc. (Hons). degree with distinction. Appointed Vice-Principal of Islamia College, Peshawar; became Principal in 1915; the first Indian Under-Secretary to Government of India, Department of Education, 1915-19; joined I.E.S. in 1922, D.P.I., N.-W.F.P. Circle. He was greatly moved by the Hijrat Movement of Muslims of India. In order to serve the Muslim nation he resigned from I.E.S. in 1931.

In 1924 he wrote his famous book "Tazkira" both in Urdu and Arabic; founded Khaksar Movement which the British and the Hindus feared most; started *Al-Islah*, a weekly newspaper in 1931; clashed with the British Government in India; imprisoned four times up to 1947—twice in 1939 and twice in 1940-43; wrote "Constitution of Free India", "Isharat, "Karita" and innumerable pamphlets in Urdu, Persian and English. In the best interests of the Muslims he disbanded the Khaksar Movement in June 1947 just before the partition of

India. Founded the Islam League just after partition; imprisoned early in 1951 and released on July 9, 1952.

Attached foremost importance to liberation of Kashmir from Hindu clutches, and the supply of canal water, the life-blood to West Pakistan from India. To achieve this end he advocated national unity. He desired that there should be no disparity in and from between East Pakistan and West Pakistan. He considered migration of population from one wing of Pakistan to another on a large scale as a great means to this end.

For the liberation of Kashmir, organised a march into India in 1957 but the Government of Pakistan did not allow. He was most honest and sincere leader. He was involved in Doctor Khan Saheb's murder case, but he was not found guilty. He died in Sept. 1963. Allama Mashraqi was a great dynamic Muslim leader.

Alexander the Great (356-323 B.C.) King of Macedonia, son of Philip II of Macedonia and Olympias: educated by Aristotle—a great Greek philosopher: crushed a rebellion at the early age of 16. His father was assassinated in 336 B.C. and he became the King. He suppressed the uprising and a revolt at Thebes. Conquered Persia in 334 B.C. Placed Asia Minor under Macedonian rule: conquered Syria and Egypt in 331 B.C.; founded Alexandria in Egypt; invaded India in 326 B.C. Returned to Babylon and died of fever at the age of 32.

During his brief career, he gambled against the impossible and he generally won it. If a river was too rapid to be crossed, he crossed it. If an enemy was to be dislodged from the summit of a hill that was not to be scaled, he scaled it and put the enemy to flight. He conquered half the known world in thirteen years. His colossal victories were followed by a sound, sympathetic administration.

Al-Biruni (*b.* 973).—A profound Arab scholar in the court of Mahmud. He accompanied Mahmud of Ghaznavi to India and wrote an account of India.

Al-Hashimi, Lieut.-General Taha (*b.* 1888). Educated at Military Staff College, Istanbul, Officer in Turkish Army in 1906. Became a Lieutenant-General in 1936 and

Minister for Interior and Defence in 1938-1940. Became Prime Minister in 1941. His notable works are *Military Tactics*, *History of War*, *History of the Ancient East*, *Khalid in Riddha War*.

Archimedes (about 287-212 B.C.). Greek mathematician, physicist, inventor; famous for his pioneer work in physics, mechanics, hydrostatics, invented the combination of pulleys for lifting weight, devised an inclined, narrow, cylinder having a rotating spiral—known as *Archimedes' Screw*—for raising waters above their natural level. He discovered the principle known as Archimedes' Principle.

The life of Archimedes ended rather in a touching manner. Marcellus, the Roman Commander, when he conquered Syracuse admired Archimedes as his "geometrical" opponent and ordered, "Let no one care to lay a violent hand upon Archimedes. This man shall be our personal guest." Archimedes was sitting quietly in the market-place and he was very busy in drawing a circle on the sand and calculating some abstruse mathematical problem. A drunken Roman soldier rushed upon him with his sword. He was surprised and said, "Before you kill me, my friend, pray, let me finish the circle." But a sword fell upon him. As he lay dying on the ground he whispered, "Ah! well, they've taken away my body, but I shall take away my mind."

Aristotle (384-322 B.C.), Greek Philosopher, was educated at Athens. One of the world's greatest thinkers and scientific investigators. Went to Macedonia as tutor of Alexander the Great in 343 B.C. He founded a school at Athens in 335 B.C. Wrote many books on logic, metaphysics, physics, astronomy, meteorology, biology, politics, etc., out of which some 22 treatises still survive. *The Poetics* and *The Politics* were his chief works. He was the first philosopher who divided the branches of philosophy into ethics, physics, politics, logic, metaphysics, philosophy of art. Loved facts for themselves and related them to universal principles. Opposed Plato's doctrine of *ideas* and substituted it with 'form'.

Asghar Khan. Former Air Marshal Asghar Khan who started his military career with the Army after graduation from the Indian Military Academy, Dehra Dun, was seconded to the then Royal Indian Air Force in 1941. During World War II,

he saw active service as a fighter pilot in the Varkanas and later commanded No. 9 Fighter Squadron of the Royal Indian Air Force.

After the War he served as the Chief Flying Instructor at the Fighter Conversion School of the Royal Indian Air Force at Ambala.

On the establishment of Pakistan, Air Marshal Asghar Khan was appointed the first Commandant of the Pakistan Air Force College. He later commanded a fighter-bomber wing and in 1949 was given command of No. 1 Group of the Pakistan Air Force. He also served as Assistant Chief of Air Staff (Administration) and Assistant Chief of Air Staff (Operations) at Air Headquarters.

He was appointed Commander-in-Chief of the Pakistan Air Force on July 23, 1957. He was also the Pakistan Military Adviser to the South-East Asia Treaty Organisation.

He has flown all types of operational aircraft in service in the Pakistan Air Force.

A graduate of the Imperial Defence College, London, he attended the Fighter Leaders School, the Air Staff College and the Joint Services Staff in Great Britain.

Among his decorations are Hilal-i-Pakistan and Hilal-i-Quaid-i-Azam. Air Marshal Asghar Khan was awarded the order of the Taj by the Governmnet of Iran in 1951 the Grand Cross of the Order of Aeronautical Merit by the Government of Spain in 1957 and the Order of the Crown of Thailand in 1962.

Ataturk, Mustafa Kemal. *Vide* Kemal Ataturk.

Ayub Khan, Muhammad. *Vide* Muhammad Ayub Khan.

Azzam Pasha, Abdel Rahman (*b.* 1893), ex-Secretary-General of the Arab League. Educated in Egypt and London University. Member of Egyptian Parliament, 1924—36. Minister Plenipotentiary to Iran, Iraq, Turkey, Afghanistan, Bulgaria and Saudi Arabia during 1936—39. Became Minister of Sial A ffairs, Commander of Territorial Forces and Minister of Foreign Affairs, during 1939—45. He was unanimously elected as Secretary of the League of Arab States in 1945. He won many decorations from Iraq, Lebanon, Syria, Afghanistan and Turkey, and got several other war medals.

Bacon, Roger (about 1214-1294). An English philosopher, seemingly had an insight into methods of approaching the study of science that are in use today, favoured the use of Mathematics and experimentation; credited by some with the invention of the microscope, the telescope and gunpowder.

Bacon felt that there was something wrong with the system of education which had formulated a series of blind dogmas about the heavens and the earth without a single scientific experiment. He was hardly thirty when he decided that he could never become a part of that system. He thought that a man must follow the path of humility if he wanted to search for the truth. "True knowledge stems not from the authority of others, nor from a blind allegiance to antiquated degmas. More secrets of knowledge have been discovered by pain and neglected men than by men of popular fame.... for men of popular fame are busy on popular matters." The superiors of the order charged him with conspiring to produce "heresies and novelties" against the accepted traditions of mankind and placed him in solitary confinement for fourteen long years. He was set free just before his death with a broken body. But nothing could break his spirit. When he died no one noted the day of his passing. But later on a world of legend took shape around the axis of his achievements.

Banting, Frederick Grant (1891-1941). Famous scientist and physician. Educated at Toronto University. Discovered insulin. Won Nobel Prize in Medicine.

Bayar Celal (*b.* 1884). Turkish politician and banker. He was a national leader. During the War of Independence he assisted and followed Kemal Ataturk. Became Minister of Reconstruction in 1924; Minister of National Economy in 1933: Prime Minister in 1937 and resigned in 1939. He formed Democratic Party in 1945. Conducted various missions to Greece, Iran, France and Britain. Became President of the Turkish Republic in 1950 after defeating Ismet in elections. Overthrown on May 28, 1960, from Presidentship of Turkey by an Army *coup d'etat* in Turkey headed by Gursel. Thereafter he was sentenced to life imprisonment.

Berzelius, Jons Jacob Baron (1779-1848). Famous chemist. Educated at Uppsala University. Was Professor of Botany, made chemical discoveries and discovered elements, thorium, silicon, selenium; introduced system of symbols in chemistry.

Bismark, Prince Otto Von (1815—1898), *known as the man of blood and iron.* Most prominent and successful German statesman. Educated at Gottingen. Was a strong royalist called "the Iron Chancellor"; was Ambassador to France, Minister of Foreign Affairs; became President of the Cabinet in 1862, tried to establish Prussia as the head of great German nation, defeated Austria in 1866. Franco-German War (1870-71) resulted in the taking of Alsace-Lorraine from France. King William of Prussia proclaimed Emperor of Germany, Bismark made Prince and Chancellor, He strengthened German power by Triple Alliance with Austria and Italy. Enlarged army and navy and advocated German colonization. He created the German Empire and dominated it for about a score of years.

Caesar, Caius Julius (100—44 B.C.), was the greatest of all Caesars. Roman Statesman and Gereral, regarded as one of history's most versatile of geniuses; a military scientist, a politician, a statesman and an orator. Defeated Pompey and was elected consul for five years; fought successful battles in Egypt and elsewhere; returned to Rome in 47 B.C. and was made dictator for life; was assassinated in 44 B.C. at the hands of his trusted friend, Brutus.

Cevat, Acikaline (*b.* 1898). Turkish diplomatist. Educated at Galata College, Istanbul, and University of Geneva. Secretary of the Turkish Consulate-General, Geneva, 1920; Assistant Legal Adviser, Foreign Office, 1923, Secretary, Turkish Legation, Warsaw, 1924; Director-General, Second Deptt. Foreign Office, 1934; Ambassador to Moscow, 1942, Ambassador to U.K., 1945.

Cevdet Sunay, General (b. 1900— ?) Elected President of the Turkish Republic in April 1966 by the National Assembly. He was born at Trabson in 1900.

Brought up strictly in religious family traditions he

graduated from Kuleli Military School in 1917. He was sent for military training at a very early age, as there was a great need of officers in the Turkish Army at the end of the World War I and was selected for the heavy artillery.

He finished his ground training courses and was sent as a volunteer to the Palestine front on September 1, 1917 as a Lieutenant. He won the Turkish and German medals for his achievements on the battle front, was wounded in August 1918 during a British attack and was taken prisoner.

On his return from captivity, he joined the National Movement and was sent to the Gaziantep front (south-east Turkey). He was awarded a certificate of merit for his achievements during the Battle of Gaziantep.

After the Ankara Agreement ending the war in the south of Turkey, he was sent to the 41st Artillery Division on the Eastern Front. He was awarded the highest Turkish military honour (Medal of Independence) for his accomplishments in the battle, which culminated in the salvation of Izmir.

After the war he completed his studies at the Military College, joined the Military Academy in 1927 and was promoted Captain. After finishing with honours from the academy in 1930, he was sent to Edremit as the Commander of a field artillery of the Artillery Division.

In 1933 he was appointed to the Operations Department of the General Staff, became a Major in 1934, and was sent to Karakose in 1935 as the Chief of Staff of the 5th Division. He was promoted Lieutenant-Colonel in 1940. He became instructor of tactics in the Military Academy, was appointed commander of the 72nd Artillery Regiment, became a Colonel in 1943 and returned to the military Academy as the head instructor of tactics.

He wrote two books on the subject, became the Commander of the Armoured Artillery Regiment. He was appointed Brigadier-General in 1949, Chief of the Operations of the General Staff in 1950, Major-General in 1952. Commander of the 33rd Division in 1953, Commander of the IX Army Corps in May 1955, Lieutenant-General in August 1955, again Chief of the Operations of the General Staff in 1957,

Deputy Chief of General Staff in August 1958 and was promoted General in 1959.

Following the May 27, 1960 revolution he became first the Commander-in-Chief of the Armies, and then in August 1960, Chief of General Staff, a post which he held till now.

Supporter of Democracy

During all the struggles for democracy and counter-revolution to install a military dictatorsh p in Turkey, he was the most ardent supporter of democracy, along with President Gursel, and made all possible efforts to keep the army out of politics, in which he was successful.

As the representative of the famous discipline of the Turkish Army, he helped in the establishment of democracy in the country and the transfer of power in a peaceful way between the parties.

Gen. Sunay is the last serving army officer who participated in the War of Independence. He is chosen unanimously by all the parties as President because of his determination to install democracy in Turkey.

Chiang Kai-sl.ek (*b.* 1886). President of the Nationalist China. Was appointed Commander-in-Chief, in 1925. He established an administration at Wuchang in 1926 after his defeat by Chen Fhiang-ming. Acted as constitutional President of the Republic from 1928 to 1943 and became Acting-President in 1943. Was a prominent figure in China at the end of World War II. Backed up by the Western Powers he fought against the Communist China, but after defeat he went to Formosa with a remnant of his forces. With the coming of General Eisenhower into power in the U.S.A., he ind.ications were that Chiang Kai-shek might be backed up to invade the mainland of China.

Coleridge, Samuel Taylor (1772—1824). Well known English poet, lecturer, critic and philosopher. Was educated at London and Cambridge. He devised a scheme of a new way of life called "pantisocracy". Published "Biographia Literaria" which contained his views on philosophy, politics, religion and literature.

Columbus, Christopher (1441-1506). Born at Genoa, Italy, a navigator and discoverer; discovered American

continent and some of the islands in the West Indies. It is an irony of fate that he died in obscure poverty, without any admiration for what he had done.

Confucius (551-478 B.C.). Chinese philosopher and sage. Founded great world religion of Confucianism or the worship of superiors and ancestors. He translated Chinese scriptures.

Copernicus, Nicolaus (1473-1543). The son of an obscure Polish baker. Famous Polish astronomer. Proved that the sun is the centre of our system, and not the earth, as it had been held so far; was ridiculed for this. It took Copernicus thirty years to elaborate his theory of heavens. Fearing lest the hostile world should destroy his precious discovery as a premature idea, he refrained from publishing his work, *The Revelation of the Celestial Orbs* till 1543. He died a few hours after the publication of his immortal work.

Cuvier, Georges Leopold, Baron (1759-1832). French naturalist. Held important posts in the Ministry of Education and Council of State in the time of Napoleon Bonaparte. and his successors. Was a great author and his works include a systematic classification of the animal-fossil and living fishes, reptiles and mammals, etc.

Curie Pierre (1859-1909) }
Curie, Marie Madame (1867-1934) } French physicists and the pioneers in research in radio-activity, were married in 1895. They obtained radium from pitchblende, discovered the properties of radium.

Churchill, Winston Leonard Spenser (1874—1964). Son of an American mother and an English father. Educated at Harrow and Sandhurst. Joined army in 1896; started his political career as a Conservative and then turned Liberal. Became Under-Secretary for the Colonies in 1905. President of the Board of Trade, Home Secretary, 1910-11; Minister of Ammunition, 1917; remained Secretary of War during 1918-21; Chancellor of Exchequer, 1924-29. In 1932 Churchill warned the world against the advent of Hitler. The British took no note of it. England slept under Baldwin, slept under Chamberlain (Prime Minister of England) and Hitler had made tremendous war preparations. At last, German air-

attacks on England began. The British called Churchill to rescue, almost too late. Remained England's Prime Minister during 1940—45. Won World War II despite so many odds. Became Prime Minister of England for the second time in October 1951. A British statesman of world repute. In order to maintain balance of power and to avert another world war, in 1954, Mr. Churchill leaned a little towards Russia and other Communist countries against the wishes of the U.S.A. Resigned premiership in 1955.

Dalton, John (1766-1844). English chemist and physicist. Educated at Manchester. His first important work was *Meteorological Observation and Essays* (1793). He presented his atomic theory in his paper "*New System of Chemical Philosophy*". It was most revolutionary and brought him fame. Discovered the principle of gases known as "Dalton Law." He formulated a theory to explain the strange phenomenon what we call today "colour-blindness."

Dante, Alighieri (1265-1321). Great Italian poet. His greatest world-famed work is *La Divina Comedia* (the Divine Comedy) which has been translated into several leading languages. He also wrote *Convivo* (the Banquet). Dante was one of those amazing geniuses who burst on the world at intervals, independent of all reason for such an incredible grasp as they possess on the whole range of human thought and emotion.

Darwin, Charles Robert (1809-1882). As a child, Darwin was gentle, meditative and accurately observant of his surroundings. From his earliest childhood he formed the habit of noticing things for himself. He loved to collect and to study all sorts of pebbles, shells, coins, birds, eggs and insects; was deeply interested in natural history. Made a five-year cruise around the world as a naturalist on the *Beagle*—a ship. Investigated Theory of Evolution which was set forth in his *Origin of Species* in 1859. Developed it further in "*The Descent of Man*," was very much interested in scientific research.

The theory of evolution was not original with Darwin. Thousands of years before the Christian era, the writers of

the Chinese sagas are stated to have expressed a vague idea of the development of man from the lower animals. The idea was elaborated further at the hands of the Greek philosopher, Epicurus (342-270 B.C.). But, later on, the Theory of Evolution kept superseded by the Theory of Creation until Darwin placed it on scientific basis.

Davy, Sir Humphry (1778-1829). English chemist. Discovered properties of laughing gas, also discovered sodium and potassium. Inventor of the 'Davy's Safety Lamp' for miners.

Edison, Thomas Alva (1847-1931). Started life as a newsboy; had little formal education; showed inventive genius from early age. As a telegraph operator, he invented transmitter and receiver for automatic telegraph and the duplex, quadruplex transmission system. Invented the mimeograph, improved typewriter, invented telephone transmitter and the phonograph, perfected the kinetoscope into the moving picture machine. Made researches in electric lighting; his incandescent lamp, dynamo and other electrical devices were put into use. A very famous American inventor; held over 1,200 U.S. patents.

Einstein, Albert (born in 1879). German physicist. His Theory of Relativity brought him world fame and honour. It has caused a revolution in the scientific views of gravitation. Published in 1929, his work on a unified final theory. In it he tried to include, in a single mathematical formula, the laws of gravitation and electro-magnetism. Was Director of the Kaiser Wilhelm Physical Institute, Berlin, 1913-33. His translated works include *Relativity*, *Cosmic Religion*, *My Philosophy*, *The World As I See It*.

Eisenhower, General Dwight David (*b.* 1890). The 34th President of U.S.A., 18th Soldier-President of the U.S.A.; Commissioned in Infantry in 1915; served in the Office of Chief of Staff, 1933-35; Assistant to the Military Adviser in the Philippines, 1935-40; Chief of Staff of 3rd Division, 1940; Commanding General European Theatre June 1942, Commander-in-Chief Allied Forces, North Africa, November 1942; Supreme Commander Allied Expeditionary Forces, Dec. 1943; Military Governor of U.S. Occupied Zone in Germany, May—November 1945. Chief of Staff, U.S.

Army, November 1945-48; President of Columbia University, 1941; North Atlantic Supreme Commander, December 1945; holds over 40 decorations; resigned from military services to fight 1952 Presidential elections of America as Republican candidate, and won the elections by an overwhelming majority; President of U.S.A. from January 1953 to January 1961. His anti-Communist campaign got more and more pronounced. His Middle East Policy did not succeed much. Succeeded by Mr. Kennedy on January 20, 1961.

Euclid. Flourished about 300 B.C. Greek mathematician. Founded a school of mathematics at Alexandria. He is well-known for his *Elements*—a treatise on Geometry—retaining its supremacy almost to the present time.

Faraday, Michael (1791-1867). The son of an English blacksmith, was the most brilliant scientist of his generation.

As a child, he showed no promise for his future genius, was an average pupil in a common day-school, formal schooling, came to an unexpected end because of a defect in his speech, was a free apprentice in bookbinding; for some time in his spare moments he read all sorts of volumes that came to be bound at his master's shop, developed a special taste for Science, especially Chemistry. He never knew of his destiny as one of the pioneer scientists of the world.

He got a job as assistant to Sir Humphry—a famous English scientist—in the laboratory of Royal Institution, actually his duties consisted in washing the bottles, polishing the decks, sweeping the floor of the laboratory. Before long his quick mind, analytical perception and his helpful tough deferential suggestions established him as a worthy scientist. Sir Humphry allowed him to take an active part in his experiments. In 1829 he succeeded Sir Humphry as Professor of Chemistry there.

Famous for his discovery of magnetic induction and his study of the transformation of mechanical energy into electrical, discovered the induction of electric current and made the first dynamo. Experimented largely in the field of Chemistry and electro-magnetism. His best known works are *Experimental Researches in Electricity, Researches in Chemistry and Physics*.

Farouk (*b.* 1920), ex-King of Egypt and the Sudan, abdicated on July 26, 1952.

Fatima Jinnah, Miss (Khatoon-e-Pakistan). Born in 1894 at Karachi. Sister of Quaid-i-Azam Muhammad Ali Jinnah, 'Father of the Nation' and 'Founder of Pakistan'. Educated at Convent School, Khandal, Bombay. Got Diploma in Dental Surgery from Calcutta. Went with her brother to England in 1930 to attend the first Round Table Conference. Assisted her brother in the struggle for the attainment of Pakistan. She commands respect of the people of Pakistan, and is the most affectionate living leader. She is dedicating her life for Pakistan and faces difficulties for the cause of Pakistan and good of her people. Many educational, social and other institutions and associations are inspired by her. The question of liberation of Kashmir is most dear to her.

Franco, Bahmonde Francisco (*b.* 1892). Spanish General and Dictator. Was dismissed from his post by the Popular Front Government. With the assistance of Germany and Italy he caused an uprising in Spain and on the outbreak of civil war he declared revolt against 'leftist' Government. He became the supreme head of the revolt when his co-conspirators General Saujuro and Goded were killed in the civil war. At the fall of Madrid in 1939, he assumed dictatorial powers. Established friendly relations with Germany and Italy. Remained neutral in World War II.

Galilei Galileo (1564-1643). An Italian astronomer and physicist. Educated at Pisa University, changed m dical career to science. He always experimented. Even as aechild he refused to rely upon the authority of others; in his teens, while at prayers in a cathedral, he noted that the time of a swinging lamp's oscillations was the same as that of pulse-beat. Thus, he discovered the equality of time interval in the swing of a pendulum, no matter how wide its arc. The principle is now applied to the counting of human pulse, the measurement of time on the clock, the eclipses of the sun, the movement of stars. Became a Professor of Mathematics at Pisa. Demonstrated the *law of motion*, that objects of different weight dropped down from the same height at the same time, fall on the ground at the same time (allowing for

the friction of air, of course); demonstrated that the path of a *projectile is a parabola*; constructed the *first complete telescope*, detected *sun-spots* and the uneven surface of the moon; observed that the *earth revolves round the sun*, for which he was imprisoned till his death.

Gama, Vasco da (1465-1524). Portuguese navigator. Discoverer of the sea route to India, round the Cape of Good Hope. Founded colonies of Sofala and Mozambique on the east coast of Africa.

Gandhi, Mohandas Karamchand (1869-1948). The greatest Hindu leader of India. Started his political career in Africa, became interested in social justice for Indian people there. Protested continuously against the British rule in India through non-violence policy and hunger strikes. He assisted outwardly Khilafat Movement which was led by Maulana Muhammad Ali but brought about its failure and great loss to the Muslim nation. Failed to preserve proper balance between the aspirations of the Hindus and the Muslims and thus lost the faith of the Muslims in him. Worked continuously for the uplift of the Hindus; so much so that the Hindu masses gave him the appellation of "Mahatma" and "Bapu". The "Bapu" was assassinated on January 30, 1948 by a Marhatta—a preacher of "non-violence" fell victim to "violence"!

Garibaldi, Giuseppe (1807-82). Italian patriot; wanted a unified Italy under one King. Made Mazzini movement to liberate Italy and fled to South Africa. From 1834 to 1841 he took part in many a revolution. In 1860 landed in Sicily and became master of Palermo, resigned his dictatorship and offered all his conquered territory to King Victor Emmanuel.

Ghulam Muhammad, M.A., LL.B., (1895-1957), late Governor-General of Pakistan. Born on August 29, 1895. Passed M.A., LL.B. from Aligarh (India). Joined Indian Audit and Accounts Service in 1920; 1932 to 1934, Commissioner of Development to Bhopal State; 1934-39, Director of Finance, Posts and Telegraphs and Financial Adviser, Communications, Government of India; 1940. Controller-General of Purchases, Government of India; 1941, Additional Secretary to Government of India, Department of Supply; 1942-45. Finance Minister to Nizam's Government, Hyderabad

State; 1945-47. Director of Tata Co., Ltd.; August 1947, on partition of India, appointed Minister of Finance and Economic Affairs, Pakistan Government; October, 1951 appointed Governor-General of Pakistan. He took bold step to reshuffle Pakistan Cabinet and when it became necessary in the wider interest of Pakistan, in October 1954, he dissolved the Constituent Assembly of Pakistan on its failure to frame a constitution for Pakistan in seven long years; in a bid to consolidate Pakistan took step to amalgamate various provinces and states of West Pakistan into one unit. He dedicated the last ounce of his energy to consolidate Pakistan. On grounds of ill-health he resigned Governor-Generalship with effect from October 6, 1955. On the eve of his departure he said that during his tenure of office he was inspired by nothing except the nation's goodwill and welfare. He believed that he had served the country honestly and to the last limit of his human energy. He died in 1957. He has an honourable place in Pakistan's history.

Gibbon, Edward (1737-94). Well-known English historian. Wrote *The Decline and Fall of the Roman Empire.* Founder of the modern philosophy of history.

Goebbles, Paul Joseph (1897-1945). German Nazi leader, Minister of Propaganda from 1937 to 1945. Controlled theatres, broadcasting stations, newspapers, and publishing houses and brought all cultural and educational activities completely under Nazi control. His propaganda campaigns built up sympathetic movements abroad and waged successful "war of nerves" against Hitler's intended victims. Captured by the Allies. Committed suicide in Berlin in May, 1945.

Goering, Hermann Wilhelm (1893-1946). German Nazi leader. Took part in German Air Force in World War I. Advanced along with Hitler. In 1932 he became President of Reichstag; General in army and Minister of Air Forces. Became Premier of Prussia in 1933. Was administrator of the four-year plan for war preparations; captured in World War II by the Allies. Tried as war criminal at Nuremberg in 1945-46 and was condemned to death. Shortly before the execution was due, he ended his life by poisoning himself.

Goethe, Johann Wolfgang Von (1749-1832). German poet and dramatist, published many works. His dramatic

poem *Faust* is the masterpiece and considered among the world's greatest literary works. His works include *Wilhelm Meister*, *Dichtung and Wohrheit Werther*, *Torquato Tasso*, etc.

Haeckel Ernst Heinrich (1834-1919). German biologist, the German Huxley. Was Professor of Zoology. Upholder of the doctrine of evolution and Darwin's theory. His famous works are: *The Lost Link*, *General Morphology of Organism*, and *The Riddle of Universe*.

Hafeez Jullundhri, Abul Asar (*b.* 1900). Author of Shahnama-i-Islam. Was born at Jullundhur, on the 14th Jan., 1900, son of Shams-ud-Din. Early life full of financial worries. Dominates the field of Urdu poetry. His simple and effective poetry produces a feeling in which one gets entirely lost but cannot exactly describe it in words. He, in his field of work, confines himself to interpretation of what he sees and feels.

He ventured to combine historic facts with poetic talent as in his epic work *Shahnama-i-Islam*. His other works are *Naghma-i-Zar*, *Tasvir-i-Kashmir*, *Soz-o-Saz*.

Hali, Altaf Hussain, Shams-ul-Ulma (1837—1914). A plain, self-made man, an example of plain living and high thinking, a sensitive heart which devoted itself to the cause of Muslim social, moral, educational, political and literary revival; a great figure in the uplift of downtrodden Muslims of India; a great Urdu poet and prosewriter.

He was born in Panipat. Early age full of troubles. Deprived of Western education, devoted himself entirely to Oriental learning—Urdu, Persian and Arabic. In 1856 got a petty job in the Collector's office at Hissar. Came to Lahore and got in direct touch with English literature which served a turning point in his career and gave fresh impetus to his thought. In poetry he got a fame as one of the originators of a new style of Urdu poetry; wrote the famous poem 'Musaddas' called *Madd-o-Jazr-i-Islam* on the sorry condition of Musalmans.

Hali pointed out that the laws of the universe are unchanging and only the fittest can survive. Asked the Muslims to become fit if they wanted to live and cautioned them that if they did not work for their uplift they were doomed and that

the nations which did nothing to get rid of their weakness were on the verge of extinction.

Wrote *Musaddas*, *Madd-o-Jazr-i-Islam*, *Diwan-i-Hali*, *Muqaddama-e-Shi'r-o-Sha'iri*, *Hayat-i-Jawid*, *Hayat-i-Sa'di*, etc. He evolved a lucid style in literary criticism and contemporary biography.

Harver, William (1578—1657). English anatomist and physiologist. Discoverer of the theory of circulation of blood. This famous theory he explained in his *Essay on the Motion of the Heart and Blood.*

Herodotus (about 484 to 410 B.C.). Distinguished Greek historian, known as the "Father of History," He supplemented facts with much interesting information covering geography and customs gathered during his wide travels.

Hitler, Adolf (1899—1945). German Chancellor and President, leader of National Socialist Party. Born in Austria; was a carpenter in Munich in 1912. Joined the German Army in 1914 and got 'Iron Cross' for his bravery. After World War I, he became one of the Group founders and the leader of Nationalist Socialist Party. In 1923 he was imprisoned on account of unsuccessful revolt. Again he organised his party; wrote *Mein Kampf*—his autobiography. Succeeded as Chancellor in 1933. Became President after the death of Hindenburg; carried out "blood purge" of 1934 and killed several scores of his own Nazi leaders whose ambitions he feared. Persecuted the Jews. Occupied Rhineland zone in 1937 and captured Austria in 1938. Signed a non-aggression pact with Russia. Invaded Poland. In 1940 he conquered Denmark, Norway, France, Holland and Belgium. In 1941 conquered all the Balkan States and Crete and invaded Russia. By 1944 his ally Italy had fallen. U.S.A. had already declared war on Japan. The tide turned against Hitler and his "Fortress Europe" was invaded from the West as well as the East. Defeated by the Allies in 1945.

Homer (850 B.C.). The most famous Greek epic poet. He wrote two of the world's best epics: *Iliad* and *Odyssey*.

Huen Tsang. A famous Chinese. Buddhist pilgrim; came to India in the period of Harsha and wrote about his religion; stayed in India, 629-644.

Husseini, H. E. Al-Haj Amin. The Grand Mufti of Palestine. Educated at Jerusalem and Al-Azhar University, Cairo. He was an officer in Ottoman Army during World War I. Became Mufti in 1921 and was elected President of Supreme Muslim Council for life in 1922. Disagreed with the proposal for establishing Jewish National Home in Palestine and left Palestine in 1937. He went to Egypt in 1946 as a guest of King Farouk. His services for unity and power of Muslim countries are noteworthy. A very important figure in the Arab League and Motamar-i-Alam-i-Islami.

Huxley, Julian Sorrell (*b.* 1877). English author and scientist. Published many popular works on general science and biology out of which *Essays of a Biologist*, *Religion Without Revelation and What Dare I Think* are most famous.

Inayat Ullah Khan, Allama Mashraqi. Please see Allama Mashraqi.

Inonu, General Ismet (*b.* 1884). Turkish politician. Was educated at Military and Staff College. Joined 2nd Army, Edirne in 1906. Formed local patriotic society, 'Party of Union and Progress'. Became General of Staff 4th Army in Edirne in 1908. Became Chief of the General Staff, Yemen. Became Military Adviser to the Turkish Delegation. Headed Turkish Bulgarian peace negotiations. Joined Mustafa Kemal in 1920. Became Minister of Foreign Affairs in 1922 and Prime Minister during 1923—24 and 1925—37. Remained President of Turkish Republic during 1938—50. Prime Minister of Turkey, 1962.

Iqbal, Allama Sir Muhammad (1873—1938). A great poet and philosopher. He is called the "Greatest Poet of the East". Iqbal's poetry gives a new message of hope to the Muslims provided they make efforts and try to live the life of a true Muslim. To him the Muslim way of life is the only way to glory and prosperity. His works are many, the best of which are presented in *Asrar-i-Khudi*, *Javed Nama*, and *Payam-i-Mashraq*. His master-mind attained high distinction in varied human activities—politics, poetry, philosophy, ethics, education, prose, jurisprudence, creative ideology of Iqbal, not only as an educational philosopher but as a great thinker, a great humanist and the most gifted and significant

interpreter of the message of Islam for the modern world is noteworthy.

Iqbal has focussed the attention of all serious students of modern thought on the rich contribution which he has made to the complicated problems of his age. The Muslims of the Indo-Pakistan sub-continent in particular are looking for the life-giving principles implicit in his poetry in order to feed the springs of their national life.

Jeans, Sir James Hopwood (1877-1946). A brilliant English mathematician and astronomer. Educated at Cambridge University showing special talent for pure mathematics. Was Professor of Applied Mathematics in the University of Princeton. In 1910 he became Stokes Lecturer in Mathematics at Cambridge. Was author of many learned and famous works on Cosmogony and Astronomy out of which most notable are *Radiation and the Quantum Theory; Astronomy and Cosmogony, The Universe Around Us* and *the Mysterious Universe.*

Jenner, Edward (1749-1823). An eminent English physician. Discovered vaccination—a measure for guarding against smallpox. He based his work on the country belief that infection with cowpox prevented the contraction of smallpox and knowing that every country-saying had some truth in it, he worked for twenty years and established his principle of vaccination.

Jinnah, Muhammad Ali, Quaid-i-Azam (1876-1948). "Founder of Pakistan," "Father of the Nation". Few men in history have created and founded a state by peaceful agitation. He took an inchoate mass and moulded it into a nation. By "Faith, Unity and Discipline" he converted it into a dynamic force which swept a sub-continent and altered the destinies of a human race, by laying the foundations of the second biggest Muslim State—the world's fifth largest—an achievement without parallel in the annals of civilisation.

Born at Karachi on 25th December, 1876. Son of a leading merchant. Studied at the Gokaldas Taj P. School, Bombay, Sind Madrasa, Mission High School, Bombay. Sailed to England for further studies at the age of sixteen. Qualified himself for the bar with distinction from the Lincoln's

Inn in 1896. During his stay in England he also studied at close quarters the working of the British Parliamentary system.

A Successful Lawyer. In 1896 started legal practice at Karachi. A year later shifted to Bombay to find a wider field for his talents. Soon emerged as a leading member of the Bombay Bar. From 1930 to 1934 he practised in England at the Privy Council and established his superiority. On return to Bombay, acquired a resounding reputation.

Legislator. For forty years he played important part in India's Central Legislature by his great ability, combined with integrity and independence. Elected unanimously to the Supreme Legislative Council in 1909. A fine debater, there was no important motion on which he did not speak and he was one of those few whose speeches were eagerly awaited and respectfully heard by crowded Houses. As leader of the Independent Party in the Central Legislative Assembly, he held the scales between the Government and the Opposition and became the sole arbiter of the fate of many a vital motion.

Ambassador of Unity. Joined the Indian National Congress, the only All-India political organisation which stood for the attainment of self-government by peaceful means. Hindu leaders like Tilak, Bepin Chandra Pal, etc., advocated violence and sought to give a Hindu revivalist trend to the political struggle. Some leading Muslims smelt a rat in the Congress and formed the All-India Muslim League in 1906. Jinnah became hero of both the Congress and the League. He was member of both the parties. From 1915 to 1920 the Congress and League sessions were held simultaneously and at the same place. Jinnah continuously acted as a mediator and tried to bring about a genuine understanding and goodwill between the two communities, won title of the "Ambassador of the Unity." At the instance of Jinnah, "Memorandum of the Nineteen," a joint memorandum, was submitted to the British Government for immediate transfer to the Indians of a substantial measure of self-government, and Montagu-Chelmsford Scheme of 1918 was a step to meet the joint national demand. In acknowledgement of Jinnah's services and popularity "Jinnah Hall' was built in Bombay.

Left the Hindu Congress. The Congress rejected the

Reform Scheme of 1918 as inadequate. Mr. Gandhi and the Hindu Congress launched Non-violent Non-co-operation Movement at the Nagpur Session of 1920. It was a departure from the policy of constitutional agitation. Mr. Jinnah opposed it, was an inveterate opponent of Mr. Gandhi's religio-political tactics. He was convinced that the Hindus were pursuing a deliberate policy of which the ultimate, if not the immediate, aim was Hindu domination over the entire sub-continent of India. Resigned Congress membership after more than two decades of ardent association.

Reorganised the League. In March 1929, Jinnah summed up the Muslim demand in the famous "Fourteen Points." Round Table Conferences were held in 1930-32. In 1934 he set about reorganising the Muslim League; with characteristic thoroughness and vigour he reunited the dissident groups and made the Muslim League an active and united organisation of Muslim India. Government of India Act, 1935 was accepted by the League. Was President of the Central Board constituted for elections. League's success at the polls was remarkable but it was not such as would enable the League to play an effective roll in the legislatures. The Congress won a clear majority except in the Punjab, Sind and Bengal and rejected Jinnah's offer of coalition ministries. Pandit Jawahar Lal Nehru declared that in India there were only two parties—the Congress and the British. Jinnah claimed that there was also a third party—the Muslim nation.

Demand for Pakistan. In the Lucknow session of the League which took place in 1937, under the presidentship of Mr. Jinnah, the League changed its goal from Dominion Status to full Independence in the form of free, democratic states. It was a landmark in the history of Muslim struggle for self-determination. The ministerial parties in the Bengal and Punjab joined the League and accepted Jinnah's leadership. The conduct of Congress Ministeries made it quite clear that under Hindu domination there was no place for the Muslims. In the famous Lahore Resolution of March 1940 the Muslim League under the presidentship of Jinnah, demanded the establishment of Pakistan (comprising of Muslim majority areas in India), an independent sovereign state. In other words, a division of India into two sovereign states—Pakistan

and Hindustan—was demanded. The Muslim claim for a separate state was, for the first time, admitted in the famous Crips offer of 1942.

In 1946, after the World War II, conferences between the Cabinet Mission, the Congress and Muslim League took place. The British and the Congress wanted and tried their best to establish a strong centre, although the right of self-determination for Muslims was no longer disputed. Jinnah (even in the face of threats to his life) was steadfast in his aim, withstood all manoeuvres with ability, courage and shrewdness which won him praise of friend and foe alike. It is notable that the Cabinet Mission Plan was based on "grouping" of provinces and the "Groups" were to be autonomous. A Union Centre was to administer Defence, Foreign Affairs and Communications. The Congress accepted it in the first instance and later on interpreted that under the plan any province or a part of province could opt out of a group even before the constitution was framed. Jinnah contended the Congress interpretation and the British Cabinet upheld his contentions. The Cabinet Mission Plans scrapped, the British Government resolved to transfer power, not later than June, 1948, as considered fit. Lord Mountbatten Plan, as announced on June 3, 1947, was discussed and accepted both by the Muslim League and the Congress. The partition of India was conceded subject to the wishes of the people in Muslim majority areas being ascertained. The verdict of Muslim majority areas was overwhelmingly in favour of Pakistan.

Pakistan Established. After seven years' hard struggle Jinnah redeemed his pledge to the nation. Pakistan, the fifth largest and the second biggest Muslim State in the world, was established on August 15, 1947.

His Last Struggle. The birth of Pakistan brought no respite for Jinnah. He took up the reins of the young State as Governor-General amidst all the disadvantages and innumerable difficulties for the State. The hard task of his life began at the age of 71. He was the hardest-worked individual in Pakistan. His days—and nights too, for he slept not more than 4 hours—were dedicated to the task of building

up the young State. Conferences, discussions with his ministers and public men, visits to provinces, attention to nation-building schemes, every minute of his time was taken up by the public work. His physicians wanted him to take long intervals of rest and short hours of hard work. But he did just the opposite, knowing quite well the risk he was running. He died, as he had lived, in the service of the Muslim nation.

"The Quaid-i-Azam fought all his battles single-handed with courage, fortitude and determination. Often his firm adherence to what he considered to be right and tenacity of purpose were misunderstood by lesser people as obstinacy. He never wanted to share his sorrow with others."

Quaid-i-Azam's Historic Message. "....Remember that the establishment of Pakistan is a fact of which there is no parallel in the history of the world. It is the largest Muslim State in the world, and it is destined to play its magnificent part year after year, as we go on, provided we serve Pakistan honestly, earnestly and selflessly.

Nature has given you everything, you have unlimited resources. The foundation of State has been laid, and it is now for you to build, and build as quickly and as well as you can. So go ahead and I wish you God-speed....!"

Kahil Amin, Ibrahim (*b.* 1804). Egyptian educationist, studied at the Universities of Egypt and England. Was Lecturer in Chemistry in Cairo. Became Minister of Education in Egypt. His notable works include *Outline of Modern Chemistry*, *Outline of Modern Physics*, *Science in War*, *Fire and Light Throughout the Ages*.

Karl Marx, Heinrich (1818-1883). German philosopher and political economist. Educated at the Universities of Bonn and Berlin, was a brilliant scholar and "impractical" dreamer, dedicated his life to fellow-service. Was banished from Prussia on account of being editor of a revolutionary paper. Wrote several books out of which *Das Kapital* is the main source of socialistic and communist theories. The book threw a bombshell into the conventional circles of economic theories.

The voice behind the second Russian Revolution which took place in 1917, although it was Lenin who led it, was that of Marx. Marx founded the scientific communism and on Marxism are based the principles of modern communism. Marxist teachings have produced tremendous influence in recent history, in social, economic and political struggles.

Kashani, Ayatullah (sign of God) **Abdul Ghassem.** The nationalist leader of Iran; formidable speaker; his power is not limited to Iran, it extends to several Muslim countries. Born about seventy-four years ago in Tehran, son of a *mulla* (religious leader) of some repute in Persia and Iraq; his family comes from Kashan in Central Persia (hence his name). At the age of 15 years his father took him to Najaf for religious studies. His father and he fought together in the Iraqi nationalist movement against the British at the end of World War I. His father was killed but Kashani survived him and went to Kurdistan mountains, condemned with a death sentence, and travelled secretly to Qum, in Central Iran, and thence to Tehran a few days before the *coup d' etat* staged by the cavalry N.C.O. Raza Pehlvi, Reza Shah and Kashani were on good terms. In 1941 the British deposed Reza Shah. Kashani contacted the Germans but was later on jailed by the British; released at the end of World War II, arrested by Ghavam, and put into jail, had a hand in forcing the resignation of Hajir in 1948, a Prime Minister of Iran; arrested in 1949 on the charge of an attempt to kill the Shah; banished out of Iran, lived in Beirut in the Lebanon; elected to Iranian Assembly in his absence, returned to Iran in 1950 in triumph; supported Dr. Mossadeq's National Front of oil nationalization. It was said that he had a hand in the assassination of the Prime Minister General Razmara. His power and prestige steadily increased. Kashani has very strong Pan-Islamic views. He was once the Speaker of the Mejlis. A split in Kashani and Dr. Mossadeq, ex-Premier of Iran, brought about their downfall.

Kalvin, William Thomson (1824—1907). British scientist. Educated at Cambridge. Became professor of Natural Philosophy at Glasgow. Famous for research in every branch of physical and electrical sciences. The submarine cable and the improved mariner's compass are two of his most

valuable achievements. He also invented the sounding apparatus instruments for calculating position at sea and many other nautical appliances.

Kepler, Johann (1571—1630). Famous astronomer. Discovered the theories relating to the motion of planets. In 1609 he published a work in connection with two laws governing the periodic motions of planets which are known as Kepler's Laws.

Kemal Ataturk, Kemal Pasha or **Ghazi Mustafa** (1881—1938). Kemal, one of the greatest generals and statesmen of the world, the maker of Modern Turkey, son of Ali Reza, a revenue collector for the Sultan of Turkey, was born at Salonika, educated at Imperial Military School, Istanbul. He loved and respected his parents, but at school he neither loved nor respected his teachers. While yet a boy his father died. Kemal tilled the soil and grazed the sheep of his uncle for some time; did much thinking as he lay under the stars watching his uncle's sheep; decided for himself the life of a soldier—to die for others—which would be something. To his mother, he was born rebel; he refused to set up life with the step-father's help. "I will carve out my own career in my own way," he said.

He became deeply interested in the cause of nationalism in Turkey; organized a secret revolutionary society under the name of Watan (Homeland—a word forbidden at the command of the Turkish Sultan, was arrested and sent to prison. Released, gained distinction as a soldier serving in Turco-Italian War, 1911-1912; won the rank of Major. Further plotted rebellion against a despot Sultan's regime, refused to submit to tyranny, considered as better the dangers of the battlefield than the safety of a corrupt palace. The Balkans declared war on Turkey, captured Salonika and pounced at the gates of Constantinople. Mustafa was considered a "saviour". In World War I he served at Gallipoli on the front. His men asked him to take shelter when he was within the range of the British gunners. He said, "For your sake I stay here, can't show you a bad example, you know." Amidst enemy shots he continued to watch the enemy. When the World War I ended, Mustafa objected to the severe terms

of the Armistice of Mudros and for this he was exiled to Anatolia by the Sultan.

In exile he formed the Turkish Nationalist Party, called the National Assembly at Sina, in 1919. In 1920 a provisional Government was set up at Angora with Kemal as its head, because he considered,..........if the Imperial Government fails in this mission (of creating a free Turkish nation), a revolutionary Government must take its place."

The entire Turkish army, and the entire Turkish nation was now behind Mustafa Kemal.

As President of Turkish Republic he made many reforms for Westernizing the country. Abolished Caliphate, monasteries; banished the dervishes, babas and the magicians and the fakirs from the temple courts and the city squares; introduced a programme of national education; revised the taxes and introduced new law codes. His native genius transformed Turkey—"the sick man of Europe"—into a modern developed nation.

Khalid bin Walid. Prominent general in the time of Caliph Omar, born-soldier and powerful orator. He fought many successful battles for the cause of Islam. Was one of the greatest generals of the world. Defeated numerous and well-equipped armies of Persian and Byzantine Empires with a limited number of soldiers, fought some 100 battles. Brought glory to Islam in its early stages and set it on the smooth course of progressive development.

Lavoisier, Antoine Larent (1743-9). French scientist, founder of modern chemistry. Discovered that matter cannot be destroyed. Made experiments in oxidation and combustion and formulated theories which became the basis of later discoveries in chemical research. Was guillotined in the "Reign of Terror" during the French Revolution.

Lenin, Vladimir Ilyich (1870-1924). Bolshevist leader and founder of the U.S.S.R. Educated at the University of Kazan. Exiled to Siberia on account of his revolutionary activities in 1897. Was editor of *Iskra*, organ of the Socialist Democratic Party. Returned to Russia in 1917 after the breakdown of the Czardom. President and supreme head of the Soviet Government from 1917 to 1924.

Lincoln, Abraham (1809-1865). Was U.S. President. The career of Abraham Lincoln is summed up in the famous phrase: "From Log-cabin to White House."

Born in a cottage. His family, in poor circumstances, moved from place to place and settled at last. Became a clerk in a small store, worked as a woodman, flat boatman, surveyor, village postmaster. Procured a few good books, read them by the light of pine-knots, studied law and started practice in 1837, as a country lawyer. Became member of Congress, 1847 to 1849; elected President. He was great, not in the story of his rise, but in his work for his country and for humanity. His courage and firmness defeated the Secessionists, and he piloted the nation through the agony of a civil war. Abolished slavery. Re-elected President and assassinated.

Liaquat Ali Khan (1895-1951). The first Prime Minister and Minister for Defence of Pakistan Government; a great orator, born at Karnal (India). Son of the late Ruknud-daullah Shamsher Jang Nawab Rustam Ali Khan; the family owned landed estates in the Punjab and the United Provinces. Graduated from Aligarh in 1915; took his degree in M.A. from the Exeter College at Oxford in 1921; at Oxford he took active part in political debates and was treasurer of the Indian Majlis. Joined the All-India Muslim League in 1923. Elected to the U.P. Legislative Council in 1926 and remained a member of the House for 14 years. For selfless devotion to the League, became the General Secretary of the All-India Muslim League. Elected to the Central Legislative Assembly in 1940. Re-elected as Honorary Secretary of the All-India Muslim League in 1943. Invited to Simla Conference in 1945 and 1946. Became Finance Minister in the Indian Interim Govt. that preceded partition. Premier and Defence Minister of Pakistan 1947-1951. Assassinated in a public meeting at Rawalpindi (W. Pak.) on October 16, 1951. During his Premiership the most outstanding events were: (1) On March 7, 1947 he presented in the Consembly the Objectives Resolution which contained the fundamental principles of future constitution of Pakistan. (2) Liaquat-Nehru Pact on minorities concluded in April 1950. (3) He visited America in May 1950; (4) Became President of the All-Pakistan Muslim League on October 8, 1950, in addition to Premiership.

Liu, Shao-chi. Mr. Liu Shao-chi, Chairman of the People's Republic of China, was born in 1898, elected Vice-Chairman of the Central People's Government in September, 1949 and appointed Vice-Chairman of the People's Revolutionary Military Council of the Central People's Government in October the same year.

He was elected Deputy to the First National People's Congress and Chairman of the Standing Committee of the first National People's Congress in September, 1954.

He was re-elected member of the Central Committee of the Communist Party of China at its eighth National Congress and elected Vice-Chairman of the Central Committee, member of its Political Bureau and member of the Standing Committee of the Political Bureau at the first plenary session of the eighth Central Committee in September 1956.

He was elected Deputy to the Second National People's Congress in March 1959 and elected Chairman of the People's Republic of China at the first session of the Second National People's Congress in April the same year and elected Deputy to the third National People's Congress in September, 1964 and re-elected Chairman of the People's Republic of China in January 1965.

Malthus, Thomas Robert (1766-1834). An English clergyman and political economist. In his famous book "Essay on the Principle of Population" he suggests that marriage should be discouraged to limit the increase of population. His theory, called Malthusian Theory of population, is well-known.

Mao Tse-Tung (*b.* 1893). Born in Hunan (China). Participated in the revolution of 1911. Joined the Communists in 1921 and became Chairman of the Council of People's Commissars in South China. In 1936 he brought about an alliance between Communists and the Kuomintang. The alliance broke down at the renewal of civil war in 1945. Remained President of China (People's Republic) after the defeat of Chiang Kai-shek.

Marconi, Merchese Guglielmo (1874-1937). Italian engineer. Famous for the modern development of Wireless Telegraphy and Telephony. In 1909 received the Nobel

Prize for Physics. Improved the low power, short-wave transmission in 1933.

Marx, Karl. *Vide* Karl Marx.

Maududi, Abul 'Ala Syed Maulana (*b.* 1903). Son of Syed Ahmed Hussain of Hyderabad, Deccan. Divine writer on Islamic culture, editor of "Tarjuman-ul-Quran." Founded Jamaat-i-Islami. Publications; *Dakkan ki Siasi Tarikh, Al-Jihad fil-Islam, Mussalman aur Maujooda Siasi Kashmakash, Islami Ibadat par ek Tehqiqi Nazar, Khutbat*, etc.

Morsy, Samuel Finlay (1791-1872). American scientist. Inventor of the Morse system of electric telegraphs and of the Morse code of signals.

Muhammad Abdullah, Sheikh (*b*. 1905): ex-Prime Minister of Occupied Kashmir, "Lion of Kashmir," was born in village Soura, near Srinagar, in mud hut in a very poor family. Got his early education at Srinagar and Jammu. Graduated from Lahore and took his M.Sc. from Aligarh. The abject deprivation of the Kashmir's long-suffering Muslim majority beckoned to him. He plunged into politics in the late twenties, and together with Chaudhry Ghulam Abbas and other ardent young colleagues began to give support to the people's burning sense of justice and grievances and organised them to obtain their rights. He was leader of the Muslim Conference which conducted many a heroic battle against the then Maharaja's tyranny including the great struggle of 1932-34. He was imprisoned a number of times by the then Maharaja. 'Quit-Kashmir Movement' of 1946 had got his patronage. He became Prime Minister of Occupied Kashmir in 1947. He was arrested and imprisoned in August 1953 because of his differences with the Government of India's Kashmir policy. He was released in January 1958 after 4½ years and was rearrested and locked up on April 29, 1958. He is the most sincere, courageous and beloved leader of the Kashmiris.

The keynote of his policy towards Kashmir Dispute is its solution through impartial plebiscite. At his re-arrest he said that if the Indian leaders including Mr. Nehru wanted to keep Kashmir tied to the Indian Union by keeping him in jail let them try this method too. He said, "the enemy

has already lost the battle and like a dying man is making last bid to hold Kashmir."

Mohammad Ali, Chaudhary: ex-Prime Minister of Pakistan. From a modest and unassuming college lecturer he rose to the exalted office of Prime Minister of Pakistan by sheer merit. Son of the late Chaudhry Khairuddin, was born on July 15, 1905 at Jullundur (now in East Punjab). Obtained his Degree of M.Sc. in 1927 from the Punjab. Throughout his academic career he is said to have obtained a First Class First in all examinations. After his M.Sc. for some time he was a lecturer in Chemistry in the Islamia College, Lahore. He had an ambition to devote his life to higher researches in Chemistry. Joined Indian Audit and Accounts Service in 1928. In 1932 deputed as Accountant-General, Bahawalpur to set the finances of the State on a sound footing. Joined the Government of India as Secretary to the Finance Minister, in 1938; Deputy Financial Adviser in 1939. Joint Financial Adviser, Military Finances and Additional Financial Adviser, Department of Supply, 1943. The first Indian to be appointed to the post of Financial Adviser of War and Supply in 1945. Appointed a member of the Steering Committee of the Partition Council of India and Pakistan and rendered great services to the cause of Pakistan.

On the establishment of Pakistan he was appointed Secretary-General, Government of Pakistan, from 15-8-47 to 23-10-51. Minister for Finance and Economic Affairs from October 1951 to August, 1955. Prime Minister of Pakistan from August, 1955. Credited for framing constitution of Pakistan. Succeeded in getting the One-unit Bill passed in the Constituent Assembly. Attaches great importance to the solution of Kashmir problem and Canal Waters Dispute.

Since 1951, when he joined the Central Cabinet, he played an important part in almost all political developments but scrupulously remained in the background and made his contribution in behind-the-scene group discussions and decisions. Resigned in September 1956.

Qasim, Abdul Karim (*b.* 1914). Became Prime Minister of Iraqi Republic in July 1958. He led the army *coup* and overthrew King Feisal of Iraq on July 14. 1958. He left the

Military College in 1934. Became Brigadier in 1955. Later on in a coup staged by the late, Abdus-Salaam Aref he was deposed and killed.

The inner voice of his heart is expressed in his own words: "From the day I left the Military College, I remarked that the administration and policy of this country was going from bad to worse. I decided from that day on a revolution.

Muhammad Ali Jinnah, Quaid-i-Azam. See Jinnah, Muhammad Ali.

Muhammad Ali, Maulana (1878-1931). Possessed versatile talents, stylish boy cricketer, one almost devotee of the Holy Quran, untiring political worker, unique mass leader, loved and hated with equal ardour, ardent anti-imperialist, perfect educationist, capable of executing his plans, a poet of note and a fiery journalist.

He lost his father in early infancy, but the mother—a sensible, sharp-witted, resolute and a noble soul—was one of the few and, perhaps, the greatest blessings which Muhammad Ali enjoyed in his life. She gave him the necessary care, guidance, and sent her sons to English schools and then to Aligarh.

Aligarh played a tremendous part in the making of Muhammad Ali. The two dominating influences of religion and politics were united at this great institution. Did not distinguish in studies except in Degree Examination where he stood first; was rather a clever, naughty boy. Graduated from England at the age of 24. Joined Rampur State as Chief Education Officer, but came into clash with the administration over his proposal of reforming the system of religious instruction. Then he joined Baroda State.

From the very start he was conscious of his obligations to Islam and his country, was one of the behind-the-scene workers at the 1906 Conference which instituted the Muslim League; was one of the authors of the communal electorates in 1909. Enlarged his political and social activities by the famous journal, *Comrade;* used it as a means for advocating the cause of his community: recognising the necessity of an Urdu paper started a weekly, *Hamdard.* It was a pioneer in Urdu journalism and made a venture to publish his paper in Naskh type.

For his heroic advocacy of the Muslim cause at home and abroad, the British marked him out as a dangerous man. His paper and press securities were forfeited several times. He was put into jail from November, 1915 to December 1919. His political life began in the prison. After release did much work for the Khilafat Movement; a notable scholar of Muslim political thought. The last eleven years of his life were spent in railway compartments; undertook extensive tours to rouse the Muslim masses. This very awakening formed the basis of subsequent demand of nationhood by the Muslim India.

During his Karachi trial he set out the basic principle of Muslim faith; that is, when a man accepts the path of God he accepts it as a whole and not in parts, he acknowledges the ultimate supremacy of the Law of God over all worldly legislation. And he refused to honour the law of the King when and where it sought to supersede the Word of God.

At long last and after all his political falterings Muhammad Ali realised the truth when Hindu Congress under the leadership of Gandhi disregarded the Muslims. The Maulana, then, claimed that Muslims in India could not be considered as a minority and a solution of the Indian problem was acceptable only when the Muslims were given autonomous control in the majority provinces. Addressing the plenary session of the Round Table Conference on November 16, 1930, he uttered the fateful words: "I want to go back to my country if I can go back with the substance of freedom in hand otherwise I will not be back to a slave country. I would even prefer to die in a sovereign country so long as it is a free country, and if you do not give us freedom in India, you will have to give me a grave here." These words proved true, because his blood veins burst on January 1, 1931, and he died. He was buried in Jerusalem.

Mossadeq, Dr. Mohammad, LL.D. (*b.* 1880). The champion of nationalising Iran's oil industry; Iranian lawyer; ex-Premier of Iran; a man of force and capacity, defeated many opponents and diplomats and nationalised Iran's oil industry but internal frictions, external hurdles, economic difficulties and opposition to the Shah of Iran, brought about his downfall. He was tried by General Zahedi's regime and sentenced to solitary imprisonment.

Muhammad Ayub Khan, Field-Marshal. First Pakistani C-in-C of Pak Army. Bears a towering personality, a vast fount of military knowledge and deep understanding of human nature. Belongs to the Frontier Province. Educated at the Muslim University, Aligarh, before he went to Royal Military College, Sandhurst, where he was commissioned in 1928. Posted to the 1st Battalion of the 14th Punjab Regiment before partition. In World War II he saw active service in Burma.

Early in 1947, he was promoted Colonel and was appointed a Brigade Commander and commanded the Garadai Brigade in Waziristan till the troops were withdrawn from that area as a matter of general policy. He was then appointed to command troops in East Pakistan, promoted Major-General in December 1948, became the first Commander in East Pakistan, afterwards appointed Adjutant-General, Pakistan Army.

He visited West Germany to see the British Army of the Rhine and attended a training exercise 'broadside'. He visited the army of occupation in Austria and Trieste: also visited a number of training establishments in the United Kingdom.

Appointed C-in-C on 18th January 1949. Defence Minister in Central Cabinet, in addition, from November 1951 to August 1955. Appointed Chief Martial Law Administrator and Supreme Commander of Armed Forces on 7-10-1958. Became President of Pakistan on 27-10-1958.

His conduct of affairs of the State in war and peace has endeared him to the nation. The prestige of Pakistan abroad has been enhanced.

Mussallam, Al Attar Pasha (*b*. 1892). Jordanian lawyer and writer. Educated at the University of Constantinople. Awarded War Medal. Secretary of the Scientific Branch of Constantinople Governorate. He practised law in Transjordan in 1921; became Minister of Justice and Finance and Minister of Interior and Communications. His important publications are *Ways of Success for Men*, *Buds of the Morning*.

Mussolini, Benito (1883-1945). Italian Dictator from 1922—1943. Son of a blacksmith. Was teacher in his

early life. Then a journalist and worked actively for Socialist Movement. Banished for his propagandist activities. To spread his views on patriotism, he founded *Il Popolo di Italia* in 1941. Became Prime Minister in 1922, in 1925, he suppressed all opposition and became a dictator. Took Ethiopia and Albania in 1935-36. Exchanged visits with Hitler in 1937-38 which brought an alliance—Rome-Berlin Axis—between the two leaders, sided Germany as an Axis Power in the World War II. Defeated and imprisoned. Assassinated by an Italian in 1945.

Mustafa Kemal, Ghazi. See Ataturk, Mustafa Kemal.

Napoleon Bonaparte (1769-1821). Napoleon by his force of personality, clear thinking, military genius and dominating ambition made himself the Emperor of France and he defied the united forces of all the Powers of Europe.

Born in Ajaccio, Corsica, son of a lawyer. Educated for the Army; sub- 'eutenant in the province at the beginning of French Revolution; was to be guillotined during the reign of terror, but he escaped that fate. Published a republican pamphlet in 1793; captain in 1792.

He had an extraordinary power of concentration. Possessed a "magnetic personality," and above all, the art of inspiring the confidence, the admiration, the burning love of his men. This faculty added to his mastery of strategy and tactics placing him in the forefront of the world's greatest captains.

Because of the brilliance he displayed as a commander of the artillery in the siege and capture of Toulon, Napoleon was appointed General of Brigade and Commander of the army of Italy. Landed at Alexandria in 1798 and captured Egypt within three weeks. Suppressed Royalist and Jacobin conspiracies. Crowned as Emperor of France in 1804.

His policy alarmed the rulers of Europe who joined in a coalition which was backed up by British with ships, money and men. His intended march against Britain was wiped out. He overran most of the Europe—Germany, Prussia, Austria, etc. Hitherto Russia was Napoleon's ally and he was virtually the master of Europe. The Czar Alexander of Russia broke away from Napoleon's economic bondage

known as the "Continental System" which had sought to close every European port against the goods of his relentless enemy, England.

This fatal rupture ended in the great invasion of Russia in 1812. Marched on Moscow, winter set in, his supplies ran short, great part of his army ruined, realised his blunder too late and came back. This great loss revived the coalition against Napoleon. Austria, Prussia and Sweden joined forces with the Russians and marched into Paris. Napoleon slipped away quietly to Elba, a Mediterranean island. In 1815 returned to France at the head of a force. His veterans rallied round him; within three weeks he was in Paris and restored to his greatness. But shortly afterwards met a disastrous defeat at Waterloo at the hands of the Allies, captured and imprisoned at St. Helena. For six long years he lingered there and died in 1821.

His constructive and administrative works, as ruler and law-giver, are his most enduring achievements. The *Code Napoleon* is his chief lasting legacy.

Nazimuddin, Khwaja, Al-Haj (1894—1964) ex-Prime Minister of Pakistan. Son of the late Khwaja Nizamuddin of "Ahsan Manzil", Dacca. Born on July 19, 1894 Educated at the Muslim Anglo-Oriental College, Aligarh, Dunstable Grammar School and Trinity Hall, Cambridge. Entered politics in 1922. Elected Chairman of Dacca Municipality: Member of the Executive Council, Dacca University, from 1923 to 1929: Home Member and Chief Minister in undivided Bengal. Leader of Opposition and leader of the Muslim League Working Committee continuously for 10 years from 1937 to 1947. On partition, he became the first Chief Minister of East Pakistan in 1947. He succeeded the late Qaid-i-Azam M. A. Jinnah as Governor-General of Pakistan in September 1948. Assumed charge as Prime Minister in October 1951 after the assassination of Liaquat Ali Khan. In addition to Premiership he was elected President of the All-Pakistan Muslim League on November 16, 1951. Removed from Premiership in 1953. Retired from Politics; elected President of the renewed Pakistan Muslim League on 27th October 1962.

Nasser, Gamal Abdel. Lieutenant-Col. Gamal Abdel

Nasser, UAR's President, a key figure in Middle East politics. "Son of Egypt, Hero of Revolution", "Champion of Peace and Liberty, and Liberator of the Middle East" as once called in Egypt, was born on January 15, 1918 at Bani Mura village in the Assiut Province of Upper Egypt. His father was a postal employee. A political agitator when only 17, joined young Egyptian patriots fighting the British. Wounded in 1935 when leading a procession against the British and the Government in power.

Joined Egyptian Military Academy in 1937, graduated as 2nd Lieutenant. During the World War II. Fought the Palestine war in 1948, encircled in Falluja but in a desperate battle broke through Israeli forces. He earned the nickname of "Tiger of Falluja."

President Nasser is said to have founded in 1948 the "Free Officers", a secret society of young army officers to overthrow King Farouk and his regime. Main "backroom boy" of the military revolution movement of 1952 headed by Neguib. Head of "Liberation Rally" in 1953. Political parties abolished. Vice-President of the Revolution Command Council in May 1953. Deputy Prime Minister and Minister of Interior from June 1953 to October 1953. Differences with Neguib, tussle over power. On April 17, 1954 became Prime Minister and President of the Revolution Command.

On July 27, 1954 he signed the Anglo-Egyptian Suez Canal Agreement which settled the long-outstanding dispute with Britain over the Suez Canal. It brought to end 72-year old British occupation of the Suez Canal. On October 26, 1956 he had a narrow escape when a member of Muslim Brotherhood fired five bullets at him. The Brotherhood was dissolved. General Neguib deprived of all official posts.

President Nasser attended the Afro-Asian Conference held at Bandung, Indonesia, in April, 1955. Visited Pakistan, India, Burma, Afghanistan, Russia etc.

After Egypt's failure to obtain arms from Western countries on reasonable terms he approached Communist powers for supply of arms on payment. This step was also to counter the Western Powers' supply of arms to Israel.

He felt dire need of unity with neighbouring Muslim countries, concluded military pacts with Saudi Arabia, Syria, Yemen, Jordan, etc.

On the night of July 26, 1956, President Nasser launched the boldest move in the history of Egypt by nationalising the Suez Canal Company which earned vast profits—more than 100,000,000 dollars every year—gave the West a stranglehold over Egypt by becoming a state within a state. After having succeeded in ending foreign military occupation Nasser made "a bid to end the economic tutelage imposed on it by foreign control of this powerful concern without waiting for the expiry of the Company's 99-year lease which expires in 1968. The nationalisation came as a sharp answer to Western Powers' decision to withdraw their promised aid to help build the High Aswan Dam.

New Constitution for Egypt replacing military rule was proclaimed and inaugurated. Elected President of U.A.R.

Nazrul-Islam (*b.* 1896). The rebel poet. A great Bengali poet, joined army as an ordinary soldier, rose to the rank of Havildar, experienced acute mental agony; one night while his fellow-soldiers were sleeping in trenches in Iraq he burst into impressive poetry which gave him relief from restlessness; his poetry is full of vigour and is most appealing. Introduced into Bengali language suitable Arabic and Persian words; his poetry brought about Muslims' renaissance in Bengal. The secret of Nazrul Islam's popularity lies in the sincerity and force of his verse. He wrote what he felt and felt bitterly; first Bengali poet who had to go to jail on account of his poems; his books were confiscated and he was several times sued in the court. *Dolon Champa*, *Agni Vina* etc., are his famous works.

Nehru, Jawahar Lal, M.A., Bar-at-Law (1889—1964). Born at Allahabad in 1889, son of Pandit Motilal Nehru. Educated at Harrow and Cambridge. Practised at the Allahabad Bar from 1911. Became important figure in the Congress party as the leader of its Socialist left wing. President of Congress in 1929, 1930, 1950-53; imprisoned several times; sacrificed his all for his country. In September, 1946, he became Foreign Minister in the Interim Government, Prime Minister since

the establishment of the Dominion of India in August 1947. (*Died in* 1964). He was the first Premier in the world who wielded power as premier for some seventeen years. Wrote several books which include his *Autobiography*, *Glimpses of World History*, *The Discovery of India; Soviet Russia, Collection of Essays etc.*

Nishtar, Sardar Abdur Rab (1899-1958). Born in Kakar family of Zhob Valley on June 13, 1899 at Peshawar. Graduated from the Panjab University in 1923. Took his Law degree from the Aligarh Muslim University in 1925. Started his career as a lawyer and politician and was prominently concerned in the Khilafat Movement. In 1929 a founder-member of the provincial Congress Committee in the former N.W.F.P. Resigned two years afterwards. Elected to provincial Assembly N.W.F.P. in 1937 and continued to be a member till 1945. Finance Minister 1943-1945. Associated with late Quaid-i-Azam intimately. A member of the Working Committee All-India Muslim League. A Muslim League Minister in the first Indian Interim Government. Communications Minister in the Pakistan Cabinet headed by Liaquat Ali Khan.

Appointed first Pakistani Governor of the Punjab in July 1949. Suffered from heart trouble. President Pakistan Muslim League 1955-58. Died on February 14, 1958, and laid to rest near the late Quaid-i-Azam and Liaquat Ali Khan.

Newton, Sir Isaac (1642-1727). Born at Woolshorpe, Lincolnshire (England); educated at Cambridge; a great mathematician. Discovered the elements of differential calculus; expounded the law of gravitation and gave the world knowledge of the principle by which the whole universe of the sun, the moon, the earth and stars exist and move. Author of the greatest works *Philosophic Naturalis, Mathematicia.* Was President of the Royal Society in 1703.

Nobel, Alfred Bernhard (*d.* 1893). Swedish chemist. He invented several explosives. Invented dynamite in 1812. He left a large fortune in trust for the award of "Nobel Prizes". Nobel Prizes are coveted awards made every year for the most outstanding work, discovery or invention in Physics, Chemistry, Medicine, Literature and promotion of international or world peace. Persons of any nationality are eligible to get them.

Nur Khan (b. 1923) (Air Marshal), M. Nur Khan on July 23, 1965 formally took over as Commander-in-Chief of the Pakistan Air Force. He holds a number of records in bombing and gunnery. In the Second World War, he was in active service during the Allied operations in Burma. He was also the Flight Commander of the only Indian squadron of the occupation forces in Japan.

After Independence, he took over command of Chaklala and Mauripur from the Royal Air Force and reorganised them with Pakistani personnel. Since then, Air Vice-Marshal Nur Khan has throughout been associated with the modernisation and reorganisation of the air force. During his tenure as the first Pakistani Air Adviser in the United Kingdom in 1948, he was responsible for the selection and procurement of first aircraft for the Pakistan Air Force.

Again as Assistant Chief of Air Staff (Operations) he organised the entry of the PAF into the jet age. He was responsible for the introduction of the United States military aid programme and planning, selection and introduction of the latest type of aircraft in the PAF.

As Station Commander, Mauripur, and Air Officer commanding the only operational group in the Pakistan Air Force he executed the transformation of the service with the introduction of Sabre jets.

During his six-year stay with the PIA, his achievements are well-known. Besides the revolutionary expansion in the national airlines he introduced an entirely new concept in the field of administration. He was appointed Chief Administrator in 1964 when PIA. Tourism and Civil Aviation were combined under one executive head resulting in an all-out improvement in the working of all the three departments.

As Chairman of the Board of Directors of the Pakistan Services, he was instrumental in the construction of ultra modern hotels in major cities of Pakistan.

Mr. Nur Khan has a passion for flying and has experience of flying various types of jet and piston-engined aircraft.

Born at Tamman, District Attock, West Pakistan, in 1923. Air Vice-Marshal Nur Khan was educated at the Prince of Wales Royal Indian Military College, Dehra Dun. He was

commissioned as a Fighter Pilot in the then Royal Indian Air Force in January, 1941.

He is a graduate from the PAF Staff College, and Joint Services Staff College, Latimer, United Kingdom. Among many decorations, he has been awarded, are Sitara-i-Pakistan and Sitara-i-Quaid-i-Azam. His services in the September 1965 Indo-Pak. War are commendable. He has also been decorated by many a foreign Government for the services rendered by him in the field of international aviation.

He is a keen sportsman and plays tennis and hockey.

Omar Bin Ibrahim Al-Khayyam (1050—1123) Persian astronomer and poet. Enriched Iranian Literature by his original contributions in *Rubaiyat*. The Rubaiyat have been translated into English and are highly appreciated. He is also famous for his revision of the calendar.

Pascal, Blaise (1023—1082). French philosopher and mathematician. Wrote a treatise on conic sections at the early age of 16. Invented a calculating machine at the age of 18. First discoverer of measuring altitude by barometric pressure. Entered religious life in 1664 and thereafter led a retired life, during which he wrote his famous works, *Provencal Letters and Pensees*.

Pasteur, Louis (1822—1895). French chemist. Professor of Chemistry at the University of Paris, 1867 to 1888 and, thereafter, director of the Pasteur Institute, established by him. Discovered the causes of fermentation of alcohol and milk; by his experiments he revealed a new world of bacteria. Put medical science on the path of finding the causes of many diseases and facilitated methods of prevention. Made researches on the affections of anthrax, chicken cholera, diptheria and rabies or hydrophobia. Founded the Pasteur Institute for the investigation and cure of infectious diseases especially of hydrophobia. Anti-rabic inoculation was also founded by him.

Pitman, Sir Isaac (1813—97). At first a clerk, then a teacher. Invented modern shorthand-writing. Founded commercial schools which bear his name. He became Knight in 1894.

Plato (428—348 B.C.). Greek philosopher. Born at Athens; a pupil of Socrates. Founded the "Academy" of his own philosophical schools. A great scholar and an original

writer. *Dialogues* and *Republic*, his masterpieces, are among the greatest works of all times.

Qaid-i-Azam Mohammad Ali Jinnah. *Vide* Jinnah, Muhammad Ali Qaid-i-Azam.

Quisling, Vidkun Abraham (1887—1945). A Norwegian pro-Nazi politician, a Major in artillery in 1931. Minister for Defence, 1931—33. Helped the Nazis secretly, first by delaying mobilisation against the Nazi invasion and secondly by undermining the morale of Norwegians by advocating the policy of non-resistance to the invasion. Hitler awarded him premiership of Norway in 1942. Grew unpopular as traitor in the eyes of his nation. Thrown out of power and tried for high treason. Shot at as a traitor. The word *quisling* has become a universal synonym for *traitor*.

Rajendra Prasad, Dr. M.A., M.L., LL.D. (*b.* 1884). President of Indian Republic from 1950 to 1962.

Educated at Presidency College, Calcutta; Professor of English, G.B.B. College, Muzaffarpore, 1908; practised at Calcutta High Court, 1911-16, Patna High Court 1916-20, Joined Mahatma Gandhi in 1917; joined the Non co-operation Movement in 1920, and all Congress movements; inprisoned many a time, General-Secretary Indian National Congress, Member Congress Working Committee; President Indian National Congress 1932, 1934, 1939 1947, Minister for Food 1947, President of the Indian Constituent Assembly 1946-49, President Indian Republic since January 26, 1950. Retired, 1962. His famous book is "India Divided."

Reuter, Paul Julius (1821—99) Organised Reuter's International News Agency and telegraphic press services.

Ramsay, Sir William (1802—1916). British chemist. Discovered many atmospheric gases, out of which neon, argon, krypton and xenon are most important. Turning his attention to the investigation of radio-active phenomena he discovered that one of th disintegrating Products of radium was helium while another mass gaseous substance—on inert gas—which he named niton (now radon).

Rommel, Erwin Eugen Johannes (1891-1944). German Field-Marshal. Was Lieutenant in World War I and fought on many fronts. After the war he became a friend of Hitler and joined the Nazi Party. The German Storm Troops and

the Elite Guards got their military training from him. He wrote two books, *Infantry Attack* and *Tasks for Platoon and Company*. Took prominent part in the annexation of Central Europe, the fall of France, the North African War and the 1944 operations.

Rontgen, Wilhelm Konrad Von (1815-1923). A German physicist; discovered Rontgen rays or H-rays with the help of which it is possible to photograph the interior of bodies. The rays have greatly improved methods of diagnosis.

Roosevelt, Franklin Delano (1882-1945). The 32nd President of U.S.A. Born at New York. Educated at Groton, Harvard and Columbia Universities. Joined bar in 1907: Entered political career in 1910 and elected to the State. Governor of New York. 1929-33; elected President of the U.S.A. in 1932. Re-elected President in 1936. He drew up Atlantic Charter with Churchill. He took part in Cairo, Quebec, Tehran and Yalta Conferences. Re-elected President in 1944. Died in April 1945.

Rosseau Jean-Jacques (1712—78). French philosopher and writer. His writings particularly "Confessions" and *The Social Contract* gave the French people a new field of thought and helped much in the bringing about of the French Revolution.

Shakespeare, William (1564—1616). The greatest English poet and dramatist. Established reputation by writing plays. *Julius Caesar, Hamlet, Macbeth, Everyman in His Humour, Merchant of Venice, As You Like It* are among his famous writings.

Shaw, George Bernard (1856—1950). Irish author and dramatist. The greatest playwright of the first half of 20th century, wrote the following plays—*John Bull's Other Island, The Doctor's Dilemma, Man and Superman, Saint John, Getting Married, Arms and the Man, Two Unexpected Isles, Geneva*, etc.

Sir Syed Ahmad. See Syed Ahmad, Sir.

Socrates (about. 469-399 B.C.) Athenian philosopher. An ugly, paunch, butt-eyed little man. Followed his father's profession of sculptor in his early age. Joined army, distinguished himself for bravery and endurance. Always studied philosophy, became noted for his honesty of thought and truthfulness. He would wander out into people and

folk of no importance. He would profess ignorance of the subject of discussion and by means of searching questions would draw his opponent into making baseless statements until they showed their true ignorance of the matter. This method of philosophic discussion is called the Socratic Method. Believed that all men would seek goodness if they had true knowledge of it; that all virtue was the knowledge of goodness; all sin, ignorance of goodness.

He claimed he obeyed God and received guidance from a spirit from within, believed in the survival of the soul—something contrary to accepted mythological gods and official worship of Athens. In 399 B.C., when he was 72 he was put on trial on the principal charges against him; that he neglected and disbelieved in the gods of true Republic and that he was corrupting the youth of the city. The court condemned him to death by drinking of hemlock (a sort of poison)—the Athenian method of capital punishment. Drank cup of poison, in obedience to law of his country, with dignified and astonishing calmness. Just after his burial the Athenians repented, boycotted his accusers universally, until some in desperation hanged themselves.

Soekarno, Dr. I. R. (*b.* 1900) President of the United States of Indonesia (U.S.I.) which was set up in 1947. The Dutch had to withdraw as desired by the U.N. Security Council. He is a great Muslim leader of the 20th century. He tided over many hurdles.

Stalin, Joseph Vissarionovitch Djugashivili (1879-1953). Marshal of the Soviet Union and Supreme Commander of the Red Army, died on March 5, 1953. The heart that is no longer beating "was that of the great leader and great teacher of the Soviet people." "A man of steel," unyielding, a short grey man, his strength lay in the power of his will, the shrewdness of his planning, the unyielding persistence of his patient upholding effort.

Stalin, son of a cobbler, was born at Ga in 1879. Did not like to go to school. He came across ideas of Marx, doctrines of revolution and other startling new theories of man's relation to his world and for the first time, the boy who had hated books sat up all night and pored over them. Joined the Russian Social Democratic Party at 17 and started a secret party founded upon Marx doctrine. Stirred up strikes

among workmen and learned the technique of revolution. Proved himself a very active revolutionary. For a period of 15 years, from 1902 to 1917, he had a succession of arrests and escapes. Surname of Stalin, Man of Steel, was given to him by Lenin. In 1924, after Lenin's death, Stalin became Secretary of the Communist Party of the U.S.S.R.; became the most prominent figure in Russia. General Secretary of the Central Executive Committee of the U.S.S.R. from 1924-1941. Became Premier in 1941.

The "great Stalin", indomitable fighter against Hitlerism, "was one of the founders of the United Nations Organisation. He inspired us, the Soviet people and all our friends in our struggle for peace and for international security." Pt. Jawahar Lal Nehru remarked: "During the past 35 years so many figures turned up but perhaps no single figure has moulded history of these years more than Stalin. He became gradually almost a legendary figure. Everyone will agree that he was a man of giant's stature, a man who moulded the destinies of his age, who, although succeeded greatly in war, will be ultimately remembered by the way he built up his country. He continued to be an awe-inspiring figure for the Western Powers.

Sun Yat-Sen (1860-1925). Founder and first President of the Chinese Republic. The first graduate of Medicine at Hong Kong, 1892. Came in contact with a revolutionary society. Led unsuccessful uprising against Manchus. Fled to America to carry on agitation. Successfully completed Chinese Revolution in 1911. Became first President of the Chinese Republic in 1912 but resigned the same year. Organised the Kuominteng, became head of the Canton Government but was driven out in 1922. Wrote *The International Development in China.*

Syed Ahmad Khan, Sir (1817-1898). The most commanding Muslim figure who wielded a very vast influence on India in general and Muslim India in particular in the latter half of the nineteenth century. Endowed by nature with a gift for writing and speaking. Had a wonderful capacity for hard work.

Born in Delhi. Entered judicial service of East India Company in 1837 a humble job in the beginning. During

'Mutiny' was at Bijnor, realised that the British had come to stay. After 'Mutiny', Muslims were hard pressed by British oppression. He tried to educate Muslims, founded the Scientific Society in 1862 for publishing translations of standard works from European languages into Urdu: advocated English education among the Muslims who then looked askance at it. Tried to bring about closer understanding between the ruler and the ruled.

Year 1867 was a turning-point in his life. Urdu-Hindi controversy began. Hindus wanted to supplant Urdu by Hindi. Syed Ahmad got convinced that the Hindus and the Muslims could never go together. Went to England in 1869; got overwhelmed with the superiority of the West; founded his Urdu monthly, *Tahzib-ul-Akhlaq* in 1870 from Delhi, meant to teach Muslims better manners, a rational understanding of religion. Founded M.A.O. College, Aligarh in 1870 with the object of giving the Muslims Western education but not at the cost of religion. Aligarh movement was political, social and partly religious.

Congress demanded a democratic government for India. Convinced that such a government would sink Muslims deeper, he cautioned them not to join the Hindu Congress; firstly because the Hindus, in the long run, had intentions to dominate the Muslims and, secondly, because the proceedings of the Congress were written in English which the Muslims, at the time, could not understand. His policy dominated the Muslims. Sir Syed became a great name for the Muslims.

He was a great supporter of Urdu and defended it against Hindi. Exercised more influence upon Urdu than perhaps any other single man in the nineteenth century. Helped to evolve a plan, informative style in Urdu. His important publications are *Asaar-us-Sanadid*, *Silsila-i-Muluk-i-Hindi* and *Wafadar Musalmanan-i-Hind*.

Tagore, Rabindranath (1861-1941). Born in Calcutta. Writer and a great Bengali poet. His works *Gitanjali* and *Chitra* are very famous. He established a school, Shantiniketen, which developed into a University.

Tara Singh, Master. The well-known Sikh leader, started his life as a school teacher, took active part in Gurdwara movement. Joined civil disobedience movement in 1930;

imprisoned several times for political activities; a prominent Akali leader, advocates Sikh rights, demands a separate Punjabi-speaking State. He committed a blunder by not joining the Quaid-i-Azam, who tried to accommodate the Sikhs very liberally.

Tensing, Norkey Sherpa, G.M. Born in Eastern Nepal. Took part in most of the expeditions undertaken for the conquest of Mount Everest; at last succeeded in its conquest along with Hillary on May 29, 1953.

Tolstoy, Count Leo Nikolayevich (1828-1910). Russian novelist and philosopher. Fought in Crimean War. His masterpieces are *War and Peace*, *Tales from Sebastopol*, *Anna Karenina* and *Resurrection*.

Trotsky, Leon Davidovich (1879-1940). Russian revolutionary, arrested for his activities in 1898. Escaped to England in 1902 with changed name. Took prominent part in the revolt of 1905, captured and exiled. Escaped to Vienna, lived in various European countries, arrested and expelled for political writings. Returned to Russia and took part in 1917 revolution. Held important posts. Differed from the Communist Party on policy; the differences with Stalin, Lenin's successor, reached height in 1927. Expelled and exiled to the Chinese frontier in 1928. Plotting with Trotsky to overthrow Stalin was a charge made against many former high Soviet officials who were destroyed by the Stalin purge of 1937-1938. *My Life*, 1930, *The Revolution Betrayed*, and *History of the Pussian Revolution* are among the several books published by Trotsky. Assassinated in Mexico, 1940.

Tulsi Das (1532-1623). A famous Sanskrit scholar and a great Hindu poet. Wrote *Ramayana* in popular style, a religious reformer.

Wilson, Woodrow (1856-1924). President of the U.S. 1913-21, Governor of New Jersey 1912-13. Joined the Allies in 1917 in World War I. Mainly contributed to the League of Nations.

Voltair, F.M. (1694-1778). A great French philosopher and a writer. Author of *Philosophical Letters*, *Discourses on Man*, *Essays on the Morals and Spirit of Nations* etc. His

writings contributed much to bringing about of the French Revolution.

Yahya Khan, (H. J., S. Pk.), General Commander-in-Chief of the Pakistan Army with effect from October 27, 1966.

Commissioned in 1938, Lt.-Gen. A. M. Yahya Khan was posted in the Baluch Regiment after a year's attachment with the 2nd Battalion of the Worcester Regiment. Soon after joining his unit he was engaged in operations on the North-Western Frontier region.

During World War II, General Yahya proceeded overseas with his Regiment and saw action in various important theatres of war.

Back home in 1945, Gen. Yahya served in various staff appointments after successfully completing a course at the Staff College, Quetta. Later, he was appointed an instructor in that institution.

When Pakistan achieved independence, General Yahya was the only Muslim instructor in the Staff College. Since Independence, he has held senior appointments at various Divisional Headquarters and General Headquarters. He was promoted Major-General and appointed Chief of the General Staff in 1957.

In 1962, he was appointed GOC East Pakistan. Since then he has been in command of various active formations at different places.

He was the first Chairman of the Capital Development Authority and in that capacity was closely associated with the preparation of the Master P' n and faster progress of Pakistan's new capital.

He was awarded the Hilal-i-Jur'at for his "boldness, determination and devotion to duty" in the Chhamb operation early in September 1965.

Zoroaster. Lived about the seventh century B.C. Persian Prophet. The ancient Persian religion absorbed many of his teachings. His teachings survive to-day among the Parsis.

PART XIII

KASHMIR PROBLEM

KASHMIR PROBLEM

The Kashmir Dispute "artificially fostered by the Partition of India" has been before the Security Council since 1947. But the case still lies undecided before the UNO, although Bharat has, by stages, integrated India-held Kashmir with her. The UN representatives, Commissions and Mediators have come and gone back to Lake Success to report, in their leisurely drawn-up learned reports, their failure to bring about a settlement.

During all this time, the Government of Pakistan have made their endeavours to solve the problem by peaceful means and have, from time to time, made diverse constructive proposals with a genuine desire to seek an honourable solution. In a spirit of sincere helpfulness, the Government of Pakistan offered their unstinted co-operation to the Security Council and its Mediation Commissions, to reach a just solution of this very vexed problem.

But the attitude of the Government of India has been all along far from helpful. Right from the beginning of this dispute India has followed a deliberate policy of obstruction in all efforts to come to a peaceful settlement. India has been assiduously following a technique under which she avoided making firm commitments and where such commitments became unavoidable, she wriggled herself out of them by harping upon her own made-up interpretation of the terms.

Pakistan is not afraid of the verdict of the people of Kashmir. But India is. She knows for certain that the people of Kashmir, in a free vote, will join Pakistan, and not India. She is determined, therefore, to keep her forces in the State and to prevent a free vote.

The facts of the case are now well-known to the whole world. It has become abundantly clear that India is not willing to abide by her earlier commitments of allowing the people of Kashmir to decide the future of their country through a free and impartial plebiscite.

HISTORICAL BACKGROUND

Kashmir has been a region of enduring peace and tranquillity through the ages. But it is an irony of fate that Kashmir which produced such distinguished persons as Dr. Muhammad Iqbal, Poet of the East, Gama, the World Champion in Wrestling, should continue to suffer untold humiliation, inhuman hardships, tyranny and repression under the Hindu-Dogra regime. The establishment of the rule of a Hindu Maharaja over a predominantly Muslim State was an accident in history. The State of Jammu and Kashmir was sold to Gulab Singh in return for his treachery to the Sikhs, by the East India Company in 1840 for a paltry sum of 75 lakhs of rupees. Ever since the State has been entirely in the hands of non-Muslims and the administration has been notoriously oppressive. On several occasions, the Muslim population has raised its voice against its oppressors, though only to be suppressed with the utmost severity. The sustained policy of the Hindu tyrants has been to keep the Muslim population in a perpetual state of abject poverty and misery.

To add to the misfortunes of the Kashmiris, at the time of Partition, Radcliffe handed over Muslim majority district of Gurdaspur to India, thus giving that country a narrow land-link with the Jammu and Kashmir State and making the unhappy sequence of events inevitable. If Radcliffe had given a judicial and not a political award, no dispute could possibly have arisen between Pakistan and Bharat.

When Sir Cyril Radcliffe was appointed to demarcate the disputed frontiers between India and Pakistan, there was secret understanding between the British and Hindu Congress leaders, that the line would be drawn up in such a way as to give India an access to Kashmir. It is widely believed that Sir Cyril Radcliffe's Award in its original draft had given Gurdaspur to Pakistan but he was persuaded by the Governor-General, Lord Mountbatten, to alter his Award in so far as Gurdaspur was concerned. This mischievous Award given by Radcliffe, the great betrayer of Muslim cause, contained the fateful misery of innocent Kashmiris.

The history of Kashmir dates far back into the legendary past and down to the time of incorporation of Kashmir in 1588

in the Moghal Empire. In 1846, Kashmir fell into the hands of the British, who made it over to Gulab Singh, a Dogra chief, for a cash payment and in consideration of his services rendered to the British. By virtue of a treaty he was recognised as an independent sovereign of Kashmir. Gulab Singh was succeeded by Maharaja Partap Singh, and later on by Sir Hari Singh, who was the ruler at the time of Partition of the Indo-Pakistan sub-continent.

Real Ties with Pakistan. Kashmir forms a natural part of Pakistan. The letter "K" in the word "Pakistan" stands for Kashmir. Geographically, the State is a part of Pakistan with which it has a common boundary of several hundred miles. Its only connection with India is a narrow strip which was most unfairly and unjustly handed over to India under the Radcliffe Award, to make road to Kashmir.

The State has a population of over four million, an overwhelming majority of which is Muslim. According to the official census reports the Muslims form 93 per cent of the population in the Kashmir Province and nearly 60 per cent in the much smaller Province of Jammu. The Muslim population, in the entire State is approximately 80 per cent.

The rivers of Kashmir—the Indus, the Jhelum and the Chenab, through which flows the life-blood of the State—all flow towards Pakistan. The rivers are extremely important arteries of commerce and trade owing to the ruggedness of surface in Kashmir, where other means of communication are few. To a State like Pakistan the sources and the upper reaches of the rivers are matters of very great concern and, as such, Kashmir deserves our fullest attention. It is here that suitable sites for constructing canal headworks are located. It is here that the rivers can be tamed to control floods by constructing dams across them. And it is only here that potential hydroelectric sources lie. If such areas belong to any power inimical to our interests, even a change in the course of rivers is not beyond the scope of modern technical achievements.

The means of communication of Kashmir also open towards Pakistan. The Sialkot-Jammu Road, the Gujrat-Bhimber Road, the Jhelum-Mirpur Road, the Jhelum Valley route, and the Abbottabad-Mansehra-Muzaffarabad Road

are all links between Pakistan and Kashmir. The route from Abbottabad northward through Kunhar Valley to Gilgit is capable of serving as a strong link between Peshawar Division of West Pakistan and Kashmir. The route is, up till now, not fully explored and properly utilised. In future too, it may not be quite important from purely military point of view but at the same time it is destined to play a significant role in fostering better political relations between Pakistan and the USSR by making the territorial contact between the two countries more effective.

Thus, geographically, economically, culturally and religiously, Kashmir is a part of Pakistan. The overwhelming Muslim character of its population, its strategic position in relation to Pakistan, the flow of its waters, the direction of its roads, the channels of its trade, the continual and intimate association which binds its people to Pakistan since times immemorial, link Kashmir indissolubly with Pakistan.

The trouble. On the 15th of August, 1947, when the Partition of this sub-continent took place, the Jammu and Kashmir State, like other States, became free to accede either to Pakistan or to India.

The geographical, economic and cultural ties of the State with Pakistan demanded that it should accede to Pakistan. Quite naturally, therefore, the overwhelming majority of the people of the State pressed for the State's accession to Pakistan and demonstrated their feelings in no uncertain manner.

The interest of the Hindu ruler, however, pointed in the direction of India, though at first he dared not take an overt step in open defiance of the wishes of the vast majority of his subjects. To avoid an immediate conflict and in order to gain time, the Maharaja adopted the trick of entering into a Standstill Agreement with Pakistan in August, 1947, with no intention of abiding by a minute longer than suited his purpose.

In September, 1947, repression and massacre of Muslims of the Jammu and Kashmir State increased and they began to seek refuge in Pakistan in ever-increasing numbers. The repression on the Muslims went on increasing relentlessly and the Hindu army of the State perpetrated acts of the utmost

savagery. In sheer desperation the Muslim population of the State broke out in open revolt in several areas and declared their independence of the tyrant Hindu ruler.

These events aroused strong feelings of sympathy for the repressed and persecuted Muslims of the State throughout Pakistan, particularly in the border areas where thousands of wounded and maimed refugees sought shelter. It was, therefore, only natural that their kinsmen as well as tribal sympathisers from neighbourly northern areas should go across the border in an endeavour to save over three million of their Muslim brethren. At this stage (October 26, 1947) the Maharaja who had already hatched a conspiracy with India, applied to India for accession and invited military aid to crush his Muslim subjects.

The Government of India hastened to accept the so-called accession and, under cover of 'protecting the State against external aggression', immediately despatched armed forces to occupy the greater part of the State. A big army was stationed for suppressing the democratic aspirations of the people of the State and establishing a military regime there.

THE FIRST ARMED CONFLICT

The fraudulently sought accession of the State to Bharat and its forced occupation by the Indian troops were acts of the gravest provocation to Pakistan. But Pakistan decided to meet provocation with conciliation. From October, 1947, onwards the Government of Pakistan made repeated efforts to reach a settlement with the Indian Government whereby the people of Kashmir could settle their future in a free plebiscite. Immediately after the entry of the Indian troops into the State on October 27, 1947, the Pakistan Government proposed a conference between the Governors-General and the Prime Ministers of Pakistan and India. The proposal contained that the two Governors-General should be given full powers to restore law and order, to undertake the administration of the State and organize a plebiscite without delay under their joint control and supervision.

India rejected the proposal and practically wanted to force a military decision in the Jammu and Kashmir State

and maintaining, at the same time, a farcical pretence of ultimately obtaining the verdict of the people of the State through plebiscite held after military subjugation of the State was complete. This was just as India did in Hyderabad and Junagadh. But India could not achieve a military decision against the Kashmiri and other Mujahids.

On January 1, 1948, India took her case to the UNO, in the shape of a complaint against the alleged invasion of the territories of Jammu and Kashmir by Pakistan nationals and tribesmen from Peshawar and Dera Ismail Khan Divisions of West Pakistan. India claimed validity of accession of Kashmir to her, while Pakistan denied both such a validity and the alleged aid given to Mujahids in Kashmir.

An all-out offensive was launched by the Indian forces in April, 1948, with unmistakable object of subjugating the entire State and of presenting the world with a *fait accompli*. The repercussions of the Indian drive in Kashmir were immediately felt in Pakistan. The Indian troops constituted a clear threat to Pakistan on the rear as well as on the flank, and the entire border between Pakistan and Jammu and Kashmir was thrown into a state of dangerous insecurity. In the face of this situation and in order to safeguard Pakistan's vital interests a limited number of Pakistani troops were sent to Kashmir early in May, 1948, to hold certain defensive positions.

INDIA FRUSTRATED U.N. EFFORTS

India Refuses Plebiscite in Kashmir. Under UNCIP negotiations, a cease-fire was arranged in Kashmir on 1st January, 1949. The next step under the two UNCIP Resolutions was the execution of a Truce Agreement for the withdrawal of Pakistani forces and the bulk of Indian forces. This was to be a condition precedent to the next step in the free and impartial plebiscite to be held under the UN auspices to decide the question of Kashmir's accession to Pakistan or to India. India's technique directed towards dodging the Kashmir Issue consisted in accepting proposals for mediation but rejecting all steps relating to arbitration.

First Refusal. India rejected the proposals of 1948. UN

Commission called a joint committee of Pakistan and Indian representatives. India and Pakistan both agreed to submit to the committee their plans for withdrawal of forces. Pakistan did so on March 9, 1949. India, at first, asked for more time, later on refused to honour its agreement.

Second Refusal. India refused to accept the UN proposal of August 1949. UN continuously tried to persuade India to honour her agreement. But she always refused to do so. At last, UN Commission concluded that India was not prepared to withdraw the bulk of her forces and was seeking to cover the refusal by interpreting the UNCIP Resolutions, in a way to suit her ulterior motives. On the recommendation of the UN Commission, UNO appointed Admiral Nimitz, as the Plebiscite Administrator to arbitrate the differences arising from interpretation of these two resolutions. Pakistan accepted the proposal but Bharat rejected it.

Third Refusal. India rejected the December, 1949 proposals. Admiral Nimitz reported his failure to the Security Council and asked its President, General McNaughten, to mediate. General McNaughten, after consultation with both the parties, formulated proposals for demilitarisation. Pakistan accepted the McNaughten proposals but Bharat rejected them.

Fourth Refusal. In July 1950, under the UN Resolution of March 1950, the Security Council appointed Sir Owen Dixon as UN representative. He was entrusted with the task of effecting demilitarization within five months. Sir Owen Dixon discussed his proposals for demilitarization but both parties rejected these proposals.

Fifth Refusal. In January, 1951, the Commonwealth Prime Ministers, who had met in London, considered removal or disbandment of all troops of interested parties as essential for holding a free plebiscite in Kashmir. They suggested for the security of the State:

(*i*) a Commonwealth force from Australia and New Zealand at their own expense;

(*ii*) a joint force of India and Pakistan;

(*iii*) a local force to be raised by the Plebiscite Administrator.

The proposals were accepted by Pakistan one by one, but India rejected them as usual.

Sixth Refusal. In March 1951, Ambassador Muniz, of Brazil, proposed to both India and Pakistan that they should agree to arbitration on all points of difference arising from the two UNCIP Resolutions, of 13th August, 1948 and 5th January, 1949. Pakistan accepted these proposals but Bharat did not agree to them.

Seventh Refusal. The Anglo-American Resolution presented to the Security Council on February 22, 1951, proposed a new solution to the Kashmir Problem. UN representative was to prepare plans for a free and impartial plebiscite. If lack of agreements between the parties prevented the UN representative from preparing an agreed programme for both demilitarization and plebiscite, they were to be asked to submit points of difference to arbitration under the auspices of the International Court. While Pakistan showed its willingness to accept these proposals, India rejected them.

Eighth Refusal. Under the Anglo-US Resolution of March 30, 1951, Dr. Frank P. Graham was appointed as United Nations representative in Kashmir. He came to Indo-Pakistan sub-continent as mediator. But on account of India's intransigence his mission ended in failure. He submitted his report to the Security Council on October 16, 1951, and recommended that both India and Pakistan should try to improve relations between them and that Security Council should try again to effect demilitarization of the State of Jammu and Kashmir through the medium of negotiations.

Ninth Refusal. Under another Anglo-US Resolution adopted in October 1951, Dr. Graham was instructed to continue his efforts to obtain agreement of the parties on a plan for effecting the demilitarization. But he failed to evolve an acceptable plan for the demilitarization of Kashmir and free plebiscite to decide the State's future as India did not agree to the quantum of troops embodied in the demilitarization scheme which sought to fix the ratio between India and Pakistan troops on the two sides of the cease-fire line.

Tenth Refusal. On May 20, 1952, Dr. Graham resumed talks with the Government of Pakistan and India. But on

September 24, 1952, as usual, he reported to the Security Council his failure to effect an agreement between India and Pakistan to reach on demilitarization of Kashmir.

Eleventh Refusal. Another Anglo-American Resolution was introduced on November 5, 1952. It urged immediate negotiations at the UN Headquarters between India and Pakistan to reach an agreement on the specific number of forces to remain on each side of the cease-fire line at the end of the demilitarization in Kashmir. But on December 8, 1952, India rejected flatly the Anglo-American proposal to demilitarize the territory of Kashmir prior to a plebiscite. In December, 1952, Pakistan had agreed in the UNO to India's long-cherished demand of keeping 28,000 troops on the Indian side of the cease-fire line at the time of demilitarization in Kashmir, provided the Azad Kashmir forces were left intact. But on December 20, 1952, Pandit Nehru rejected Pakistan's demilitarization proposal for Kashmir.

Twelfth Refusal: Geneva Talks Failed. The talks on proposals embodied in another Anglo-American resolution approved on December 23, 1952, on demilitarization of Kashmir, which began between the Indian and Pakistani delegations on February 4, 1953, achieved no progress towards the solution of the Kashmir Question. The talks centred round the demilitarization of Kashmir and the number of troops on each side of the cease-fire line during the holding of a plebiscite to determine Kashmir's future status. The proposals were rejected by India.

In reporting Geneva Talks' failure on March 31, 1953 Dr. Graham said that while during the negotiations "there has been some narrowing of the gap between the positions of the Governments on the question of the number and character of the forces to remain on each side of the cease-fire line at the end of the period of demilitarization, a substantial difference in position still remains." It is observed that "the document, like some of its predecessors, is a masterpiece of equivocation and evasion and fully reflects the shilly-shallying policy which the UN has been following since it became seized of the problem." Pakistan accused Dr. Graham of "continuous yielding of ground in face of Indian intran-

sigence which amounts in effect to an endorsement, and abatement of the Indian attitude." The proposals made by Dr. Graham had "avowedly no other object than to meet India's wishes with regard to the number of forces to be retained on its side of the cease-fire line.

DIRECT INDO-PAK NEGOTIATIONS

Indo-Pak Negotiations, otherwise known as Ali-Nehru Talks, bore no fruit either. Preliminary talks between Mr. Muhammad Ali, ex-Prime Minister of Pakistan, and Mr. Jawahar Lal Nehru to settle all disputes were held in London in June, 1953. They proposed to meet again in Karachi. In the last week of July, 1955, Mr. Nehru came to Karachi. Talks on the disputes were held in a cordial atmosphere. Mr. Nehru was "very happy" with the results but acknowledged that a solution of the Kashmir problem was no nearer. "We all know that Kashmir is the toughest problem," he said, "and there is no good in my saying that it is nearer a solution."

Delhi Agreement, or Ali-Nehru Agreement. During their four-day (17th to 20th April, 1953) Delhi talks the Prime Ministers of Pakistan and India discussed the Kashmir Dispute at some length. They resolved to settle it in accordance with the wishes of the people of that State with a view to promoting their well-being. The wishes of the people could be ascertained by conducting a fair and impartial plebiscite. Such a plebiscite had been proposed and agreed upon some years ago. But progress could not be made because of lack of agreement with regard to this. It was decided that a Plebiscite Administrator for Kashmir should be appointed by the end of April 1954. It was also decided that committees of military and other experts should be appointed to advise the Prime Ministers on the implementation of "preliminary issue" relating to the plebiscite. It was agreed that on the Plebiscite Administrator's formal appointment and induction into office he would examine the situation and report on it. He would then make his proposal for preparation of a fair and impartial plebiscite in the entire State.

The direct Indo-Pak negotiations were in every sense

"within the framework of the UN." The UNO had desired both the parties to settle the dispute through bilateral talks. The question still remains a dispute between India and Pakistan and as such before the United Nations. The Communists, taking advantage of Pakistan's disappointment at UNO, began to say that the case be withdrawn from UNO.

But India wishes that the Kashmir case be withdrawn from UNO, presumably because she had utterly failed before the bar of world opinion. This was to save herself from further insult. She wanted Kashmir—an international affair—to be turned into a local and internal affair and to do so she liked just as she did in the case of Hyderabad State. Pakistan was not at all prepared to withdraw the case from UNO. Any settlement, if reached, would be reported to UNO and the Security Council would decide as she might desire.

Pakistan's Pledge. Pakistan has made it abundantly clear that it stands pledged to continue unrelentingly the struggle to obtain for the Kashmir people the free exercise of their right to self-determination. Pakistan considers it its duty to try and reach out to the people of Kashmir, to secure their right of self-determination at all costs. "Their sorrow is our sorrow, their suffering is our suffering, their misery is our misery, and their hardship is our hardship," declared the Prime Minister of Pakistan. Pakistan is also getting alive to the full-throated shouts of "Pakistan Zindabad."

ABDULLAH COUP IN KASHMIR

Abdullah Coup. On the one hand, through Ali-Nehru negotiations, India was posing to be on friendly terms with Pakistan and, on the other, Abdullah *coup* in Kashmir was being engineered feverishly. It was perhaps a ruse to give an impression of friendliness before striking hard.

At the dead of night on August 8, 1953, Sheikh Abdullah was dismissed from the premiership of India-held Kashmir and arrested along with 30 prominent officials. It may be recalled that Abdullah was taken out of prison in 1946, just after Partition and installed as Prime Minister of Kashmir to serve as a traitor to the Muslim cause in

Kashmir. He was given to understand by Hindu leaders that there would be no communalism in Kashmir. So long as he danced to the tunes of Bharat he was hailed as "Sher-i-Kashmir." But when, on realising Hindu mentality regarding Kashmir, he refused to dance to Bharati tunes and tried to go against the dictates of Hindu India, he was sent back to jail and Bakhshi Ghulam Muhammad, Sheikh Abdullah's deputy and a confirmed subservient stooge, was now stepped into his shoes. Bharat utilised Sheikh Abdullah's services in various ways. He was used as a show-boy at international level when in Kashmir Dispute India wanted to show to the world that Muslims of the State were with her. His presence as a Muslim Prime Minister of Kashmir was exploited to confuse Muslim world opinion regarding occupied part of the State. The 'accession' of Kashmir to India was declared in his time. Freewill of the Kashmiris was suppressed by force.

But, before long, Abdullah saw quite clearly that a resurgence of communalism in India would swallow up Kashmir. Bharat's communalism continued to arouse the gravest apprehensions in the minds of the Kashmir people which led Sheikh Abdullah to demand "Kashmir's separate entity." He tried to represent in very subdued terms the perils facing his people—their mass annihilation—at the hands of Bharat's communalists. Backed by his "Constituent Assmbly" he adopted successive measures wholly unpalatable to India. It was decided to abolish 'zamindari' in Kashmir without compensation. The new flag of Occupied Kashmir was very different from the Indian flag, sought to break the symbolic unity of Kashmir with India. There was a decision to terminate the monarchy in Kashmir. Uneasiness, perplexity, alarm and general feeling of disgust were the reactions in India to these measures. Underlying these measures was felt a scheme for asserting Kashmir's independence from India. Hindus felt alarmed at this as India had spent over Rs. 200 crores on the State and was committed to much more.

On the other hand, Communists in Bharat wanted to take the accession of Kashmir with India as final. Agitations throughout India were staged to this effect. "One

flag, one constitution and one supreme head of the State" was demanded. Abdullah's loyalty to Bharat was widely doubted in Bharat Union both officially and unofficially. His persistent refusal to go to Delhi despite Mr. Nehru's commands, and indications of his anti-Bharat trend of mind were interpreted as confirmed signs of revolt and there was a widespread demand for bringing him to book. An open clash with Abdullah would have weakened Bharat's stand on Kashmir. The alternative of engineering an open revolt in the Jammu and Kashmir National Conference against Abdullah and to bring about his downfall was adopted.

On August 3, 1953, Abdullah declared that "the accession of Kashmir to India in 1947, forced by the circumstances, was legally complete. *But it could be considered to have become final only when verified by the free-will of the people.* He pointed out that extreme rightist agitation in Kashmir in favour of full merger with India had caused dissension within the country and that it was almost impossible to convince the Muslim population that a merger would be in their interest. He referred to the recruitment of Muslims in State forces, and postal services which were ceded subjects and were under the administrative control of the Government of India but had been most discouraging. "This was having its effects on Muslim minds and leading them to feel that while accession to India had opened innumerable opportunities for the non-Muslim population for employment and betterment, opportunities for Muslims had very much narrowed down even in their own State." Exposing the trend of Hindu mentality Sheikh Abdullah said on July 3, 1953 that he *felt astonished to find that in certain sections in India he was lionised when he would criticise Pakistan, but these very parties would describe him as a Pakistani and communalist when he would criticise communal activities of Indian parties. "When I am dealing out justice to claims of minorities, I am being showered with praises, but when I try to do likewise to the claims of Muslims I am vilified."*

Main factors responsible for Abdullah's fall were his repudiation of the National Congress's earlier stand that Kashmir's accession to India was complete and final, his

growing disillusionment with regard to Indian policies and the possibility that he might have expressed himself in favour of accepting the will of the Kashmiri people and advocating Kashmir's accession to Pakistan. Spontaneous pro-Pakistan slogans throughout Kashmir were heard. The demand for the democratic and legitimate right of plebiscite was growing. Abdullah saw the writing on the wall. He realised that he could not rule under the Indian bayonets indefinitely. He could no longer battle against the fast mounting tide of hostile public opinion. He attempted to side-channel pro-Pakistan feeling by raising the cry of "independent Kashmir." Under the pressure of public feelings in the matter, Sheikh Abdullah refused to act according to the wishes of Hindu India. The upsurge of pro-Pakistan feelings in Kashmir had frightened Delhi and the Occupied Kashmir. India acted with dramatic suddenness, and the blow fell. Sheikh Abdullah was dismissed and imprisoned. This was "best news during the last six years" for the Hindus. What the communalists were asking for in a crude and blatant manner, the Indian Government carried out in a more clever manner. India charged Abdullah with 'maladministration, nepotism and corruption.'

Comments. The dismissal of Sheikh Abdullah was a victory for Indian communalism. It was hailed in India as the "best news in several years." Press comments from all over the world expressed universal condemnation of Bharat Government's action in arresting Sheikh Abdullah and imposing Bakhshi "Government" on the people of Kashmir. The sincerity of Pandit Nehru's much-advertised devotion to the ideal of peace and justice was openly questioned.

"It proves, if a proof was needed, that India is determined to keep Kashmir at all costs, that all talk about plebiscite and mutual negotiations is so much stuff for propaganda in the true style of imperialists." *The Irish Times* dated August 12, 1953, under the heading "Struggle for Kashmir" stated, "Mr. Nehru made all sorts of promises, including that of a free plebiscite to decide the wishes of the inhabitants in regard to their political future, but as usually happens in such matters, nothing was done until

a few days ago, when Sheikh Muhammad Abdullah, Kashmir's Premier, was suddenly arrested....It is almost certain that although there are vigorous denials from New Delhi, this new move in Kashmir has been instigated by the Indians at the moment when there are more than 10,000 Indian troops in Kashmir." "Until quite recently, Sheikh Abdullah has been regarded as Mr. Nehru's particular pet, now it seems that he has bitten the hand that fed him, daring to express those principles of political independence which Mr. Nehru for so many years has expressed in the case of India." *The Morgon Tindigen*, a Swedish Government Party paper, said, "Whatever happens in Kashmir just as what has happened or will happen elsewhere in Asia—in Tibet and in Indonesia—has replaced European imperialism." The official Dutch Socialist daily, *Het Nrye Volk* said: "It is not the first time Pandit Jawahar Lal Nehru in his policy regarding Kashmir (as for instance Hyderabad) seems lacking in conception which he pursues in regard to international policies and which he desires others to follow." The Egyptian Gazette, *Cairo*, an English language morning daily of the Societe Orientale de Publicity Group, said: "Nehru proclaimed as a champion of democracy, but it is impossible to avoid the conclusion in the light of recent events that he has special brand reserved for Kashmir and that it is labelled "Incorporated in India." The Ankara daily *Hurses* said: "Sheikh Abdullah was always a good means of propaganda for Nehru. There did not exist any such problems as Kashmir for the Indian Premier. According to him, the people of Kashmir had, of their own free-will, acceded to the Indian Republic and Pakistan's allegations, that the Kashmiris were not satisfied with the present state of affairs, were described as propaganda. New developments in Kashmir now definitely show that this is not true. Even Sheikh Abdullah himself had disapproved of the way in which Hindus treated Muslims." Some people regard this fall of the cabinet due to financial disorders. But this development is wholly political and it is connected with the increasing inclination the people of Kashmir feel towards Pakistan." *The New York Times* said: "Kashmir's accession to India was the work of the deposed Maharaja. Sheikh Abdullah, who took over the reins of Government, now has been deposed with the obvious blessing and consent of

India. Kashmiris themselves were not consulted on either acting. It is the time that their views should be heard." *The Economist*, dated August 15, 1953, stated: "It is significant that the change has produced riots in Srinagar for the first time since the Kashmir Dispute began, and it looks as if India might have won a plebiscite under the old regime but would not now." "One is astonished by the stiff, hard attitude taken by India...., the moment there is any talk about an endeavour to reach an amicable agreement, India's stipulations do not permit one to conclude that she is willing to make a friendly compromise. In fact the opposite seems true. India intends to hang on her part of Kashmir...." contained an editorial to the *Expressen*—a Swedish journal.

INTEGRATING OCCUPIED KASHMIR WITH INDIA

While the United Nations leisurely conduct negotiations and their delaying tactics are practically leading nowhere, the Government of India have been taking advantage of the situation to make major moves towards integration of the occupied parts of Kashmir with the Indian Union. The Government of India and its Kashmiri puppets are trying to create such conditions that the UNO would be discouraged from making any positive attempt to secure implementation of the resolutions for a free plebiscite in the State. India considers Kashmir her integral part, a member of the Indian Union. She claims that the "accession" was complete and final. Mr. Nehru stated about Kashmir: "It is desirable for us from the strategic point of view."

India is determined never to make a compromise on Kashmir. A report prepared on January 13, 1953, by the General Secretary of the All-India Congress submitted to the All-India Congress Committee—the policy-making body of India's ruling party—said that it would be idle to think that India would ever make any sort of compromise on principle for the sake of convenience of Pakistan. In the Kashmir Dispute, India continues to blame hypocritically that the United Nations has not moved anywhere nearer a solution on Kashmir, because it shuts its eyes to the vital facts that Pakistan is the "aggressor".

India has adopted two diametrically opposed policies with regard to Junagadh and Kashmir. She occupied Junagadh on the plea that it had a Hindu majority, regardless of the fact that its Muslim ruler had acceded to Pakistan. She occupied Kashmir because its Hindu ruler had acceded to India, regardless of the fact that it had a vast Muslim majority. This is clearly a case of "heads I win, tails you lose." But the UNO is practically silent over this distorted logic.

India used Dollar Aid to Perpetuate Occupation of Kashmir. India had been posing as would-be leader of Asia. The USA under Truman's administration encouraged Indians to believe that the United States accepted her as the future leader of Asia. India gave an impression that she was leaning towards America as against Communism. But "there is a growing feeling that India is now using the American aid running into hundreds of millions of dollars a year to support its continuation of the endless and unjustified military occupation of Kashmir," wrote the Chicago *Daily Tribune* of Oct. 29, 1953. It further said that the time had come when the United States must have a showdown with India on Asian issues, Americans believe."

Bharat's Big Bait for British Business. In September, 1953, the Trade Commission for the Jammu and Kashmir Government called tenders from British firms in England for equipment and supplies required in connection with development in Jammu and Kashmir. A sum of Rs. 7 crores was said to have been allocated for financing the Kashmir "development" plan. Bharati Government was reported to have made a bid to win over British commerical interests with large contracts for the so-called development projects near Jammu and Kashmir. Pakistani circles regarded the whole project as "bogus" and that "Bharat seems to be preparing to spend a large sum of money to bribe international *banias* under the garb of developing a territory which does not belong to it."

India wished to withdraw Kashmir Issue from the UNO. The object was to treat it as a 'dead' issue. There were rumours regarding "partition of Kashmir between India and Pakistan." But such rumours were described as "absolutely baseless" and a propaganda stunt by some interested parties.

Indian Constitution Extended over Occupied Kashmir. The "Constituent Assembly's" decision of February 1954, which was a farce and was approved only by a fraction of the total strength of 75 members of the Assembly to "ratify accession to India," was officially accepted by India on May 14, 1954. The President of the Indian Union promulgated an order under which "five parts of the Indian Constitution relating to citizenship and fundamental rights, legislative, executive and judicial organs of the Union and their powers, relations between the Union and Occupied Kashmir, finance, trade, commerce and intercourse within the Union and election to the Union Legislative bodies, etc., were applied to Occupied Kashmir with appropriate modifications." An official announcement said, "The Constituent Assembly of Occupied Kashmir had "set its final seal of approval on the constitutional relationship between the State and the Indian Union to which it acceded in 1947."

Referring to Presidential order on Kashmir, Mr. Nehru said India would not go back on pledge that she had made in the United Nations in regard to Kashmir and that she stood by those assurances and pledges and would like to see them implemented at the first suitable opportunity.

Comments.—On March 8, 1957, commenting on the "election fiasco" in India-held Kashmir the *New York Times* said in an editorial: "It was an 'election' in which no votes were cast. The India-backed candidates for Kashmir 'Assembly' were declared unopposed. Nine candidates who wished to run found nomination papers thrown out on technicalities and their opponents declared elected. Forty-four leading Kashmiris who favour a plebiscite to determine the State's political future are in jail as political prisoners. Naturally, they did not run. This is not an 'election' in any sense of the word. The term 'election' means a choice. The Kashmiris had none."

World Press Censures Bharat's Policy. The British and American Press severely criticised the application of certain provisions of the Indian Constitution to the India-occupied parts of the Jammu and Kashmir State.

The Sunday Express of May 16, 1954, wrote editorially, "Mr. Nehru is always quick to attack colonialism in others.

And even quicker to get a colony for himself." The same paper remarked, "But while the deadlock continues, Mr. Nehru slyly acts. He cashes on the delay. He issues his press statements and grabs Kashmir more securely."

The Times of May 17, 1954 editorially wrote under the heading "Mr. Nehru's Two Voices": "Further confusion has been introduced into the Kashmir Dispute by President Rajendra Prasad's proclamation, that under the provisions of Art. 370, the Constitution of the Indian Union will henceforward apply (with insignificant difference) to the State of Jammu and Kashmir. "The Government of India will find it hard to reconcile this development with its undertaking to the United Nations that the people of Kashmir shall settle their future by an impartially conducted plebiscite and with the understanding which Mr. Nehru and Mr. Mohammad Ali reached last autumn. Delhi's view seems that India cannot alter a decision taken by the 'Constituent Assembly' of Kashmir as the legitimate representative of the Kashmiri people. Yet everyone knows that the 'Assembly' is merely a caucus (a private meeting of political wire-pullers to agree upon candidates to be proposed for an ensuing election) of the National Conference party whose members were for the most part returned without opposition, while the local militia with Indian troops at their back, kept order. True to type, the Kashmir elector voted for the side of the big stick. The Security Council saw through the face and declared that nothing which the 'Assembly' might do could determine the future disposition of the state. At that time India seemed to accept this view herself but she has since turned the Assembly and the Government which controls it to good account."

The New York Times under the caption, "India and Kashmir," said editorially on May 16, 1954: "India's unilateral action in declaring that Kashmir has been brought under the Indian Constitution must be deplored....Morally and politically, it may be highly unwise, precisely because it makes more difficult ultimate solution of the tragic Kashmir problem and worsens, rather than improves, the sensitive relations between India and Pakistan...."

The Medeniyet, a Turkish paper, criticised Bharat for applying its Constitution to Kashmir. The paper said that

this action of Bharat had deadlocked the negotiations between Pakistan and Bharat. Remarking that the purpose of Bharat is plain, *Medeniyet* says that "she (Bharat) knows that a plebiscite in Kashmir will undoubtedly result in favour of Pakistan. She is, therefore, trying to gain time to be able to change the situation. The only way out for India is to try to evade her obligations. As a last resort, Mr. Nehru has put forward the excuse of military aid given to Pakistan by the United States. He (Mr. Nehru) has disclosed that the military aid has made a change in the Kashmir situation; consequently, Bharat's adherence to the obligations will depend on certain conditions." "This is strange logic," concluded the paper.

The Telegram of Toronto (Canada) in its editorial dated January 3, 1953, said, under the caption "India Blocks Plans to Settle Kashmir Dispute": "In principle, Mr. Nehru has not abandoned his previously stated point of view as far as plebiscite is concerned. But when it has been a matter of taking practical steps for meeting the demand, the New Delhi Government has scarcely acted in accordance with the principles enunciated by Mr. Nehru."

India's stipulations do not allow one to come to the conclusion that she is willing to make a friendly compromise. One rather gets the idea that in all circumstances India intends to "hang on to her part of Kashmir which, in accordance with the pact agreed to by Nehru in the summer of 1952, has become a member of the Indian Union under special conditions as compared with the other Indian States."

"It seems extraordinary that India should adopt so stubborn an attitude when Kashmir is at stake."

"Pakistan has long since been agreeable to settle the fate of Kashmir by means of a plebiscite. On the other hand, India has repeatedly prevented any form of mediation by raising obstacles in the way of reaching positive results. India's behaviour in this matter has by no means placed her in the category of being a spokesman of mutual understanding and friendly solution of national or international conflicts."

"India has nullified all attempts on mediation. Two mediators, one British and one American, have tried to have armed forces on both sides removed from Kashmir before a

plebiscite is taken, but both have failed because of India's attitude."

The Sunday Express, London, of July 24, 1955, published the following comments by George Gordon:

"Nehru, that tireless fighter for human freedom and world tranquillity, has been considerably upset by the suggestion that his arrogance towards Goa contrasts oddly with the peace advice he gives so generously to the rest of the world.

"It provoked him to an exhibition of intolerance such as we have not been familiar with since Hitler was on the stump. Let us set him a few more questions.

"What about the Muslim State of Kashmir which he is striving to tear from Pakistan and bring under India? By what authority does he deny the democratic rights of the people of Kashmir to decide their own destiny by a free election?

"What justification has he for keeping 90,000 Indian soldiers in a country that does not belong to him?

"How much responsibility lies upon him for the fact that for nearly a year Sheikh Abdullah, a former Prime Minister of Kashmir, has been locked in prison uncharged and untried, his only offence being a patriot's desire to see his country independent?

"How does the honey-tongued Nehru square that with his bleatings about the rights of all men to be free?

"And what about the Sikhs who are ardently seeking separation from India?

"What about the airlift he is establishing between India and Afghanistan against the opposition of Pakistan? What's his purpose? To aid his friends in Moscow where, as he said recently, a part of his heart lies?

"Nehru flips around the world cooing peace like a Picasso dove. But he is in fact a menace to peace."

In an editorial captioned "India Also Ignores", the Daily *Dispatch* of Erio (Pennsylvania State) said: India, the self-styled "bridge" between the East and the West and persistent international go-between seeking compromise for

peace elsewhere, herself has joined the Powers that flout and ignore the authority of the UN. To try to present the United Nations action before accession, its chief delegate Krishna Menon put on the first filibuster in the UN. speaking for two days. While this was going on in New York, Prime Minister Nehru was entertaining Marshal Zhukov, the Soviet Defence Minister in New Delhi. Premier Chou En-lai of China had also been a guest of the Premier. They plainly said that if Pakistan opposed Kashmir's annexation by force, India would have military aid of the two Communist giants.

In the course of an editorial captioned "India Seizes Kashmir", the *Lockport Union Sun and journal* of Lockport USA said: Prime Minister Nehru who did not hesitate to criticise the Anglo-French-Israeli invasion of Suez is guilty of the same sort of mistake (with less justification) as he orders the integration of the India-held section of Kashmir.

"Words and deeds do not go together in Delhi," wrote the *Pfaller Zeitung*, West German paper, in an editorial, while commenting on the Kashmir issue.

Deadlock. In the first week of March, 1954, the Prime Minister of Bharat informed the Government of Pakistan that there was no likelihood of a progress towards the solution of the Kashmir Dispute. He said that the developments regarding US military aid to Pakistan had given a set-back to the negotiations between the two Prime Ministers which started in August, 1953. The Prime Minister of Pakistan considered it "most unfortunate" that the Indian Prime Minister should regard Pakistan's decision to strengthen herself militarily "as a ground for not proceeding with the implementation of the agreement embodied in our joint communique."

Comments. Suspicion prevails that behind the scenes "hidden hands" have been operating. Perhaps the Big Powers have their own petty advantages with a view to keep the dispute alive. Perhaps they do not solve the Kashmir Problem because of the drifting sands of the balances of power in view of the collapse of Chiang Kai-shek's China. Kashmir may be an important point in Anglo-American overall global strategy against Russia.

In spite of Pakistan's steadfast loyalty to the Common-

wealth, Britain passed all these years in telling us of Indian arguments and by pointing our arguments to the Indians just to keep the dispute alive.

American attitude on the Kashmir Issue appeared to have registered a noticeable change. American dollars began to rain abundantly on the Indian soil and American capital for long-term investment was made available. The Anglo-American bloc is not prepared to displease India. Instead of solving the Kashmir Problem they adopted a policy of delay, indecision and appeasement which has gone a long way to make India stiff and highly unreasonable on the Kashmir Issue.

"The most dispassionate study of the career of the dispute in the Security Council proves calculated evasion and drift and appeasement of aggression on the part of the Anglo-Saxon Powers."

There appear to be two different international scales of justice, one for general international issues—which is majority of votes—and the other, not based on majority votes—applying only to the issues concerning the Muslims as we find in the case of Palestine, Kashmir and other such like problems.

Free and impartial plebiscite alone can lead to a just solution of the Kashmir Problem. Sardar Muhammad Ibrahim Khan, ex-President of the Azad Kashmir Government, believed that "we are subject to an international conspiracy. United Nations has tried to foster belief in the minds of the people of Kashmir and Pakistan that a solution of Kashmir can still emerge from the effort of this international organisation so that we tenaciously cling to the UN and do nothing which would embarrass the United Nations Powers in its international and global strategy. The United Nations wants to have India on its side because in the South-East Asian strategy, the Indian sub-continent will certainly be exploited if an East-West war breaks out. Therefore, India knows fully well that the Anglo-American bloc will not antagonise India on any issue, much less on Kashmir while Kashmir Issue is being dallied with by the United Nations with the assistance of India. India has definitely tried to create internal problems for Pakistan which surely can undermine

the whole State. As, for example, the language controversy in East Bengal is a good proof of the forces at work underneath. The language question is not purely indigenous to East Bengal but has its support abroad. This is done to divert the attention of Pakistan's people from the Kashmir Issue and weaken Pakistan so that she not only gives up the Kashmir struggle but also comes under the tutelage of India in South-East Asia. All this is done under a well-planned scheme."

Moscow Comments. Soviet Union charged Britain and the United States with deliberately and consistently preventing a solution of the Kashmir Dispute with the object of turning the disputed region into a trust territory and using it for an "imperialist base," against Soviet Union and China.

India's Bid to Buy Kashmir. A special correspondent of *The London Times* in Kashmir wrote in July, 1955 an article under the caption "India's Grip on Kashmir"., He said that in a free and fair plebiscite sixty per cent Kashmiris would vote for union with Pakistan and the remainder for India. "....In its present mood, Delhi will not agree to a plebiscite being held. The policy behind the aid programme is clear: "if the hearts and minds of Kashmir cannot be won, a determined effort must be made to buy them." "Indians seem to see little wrong in this policy of political stone-walling and laid with strings." "The aid programme from India to India-held Kashmir is regarded as a demonstration of the advantages of union with India."

"Indian aid is munificent, far more in comparison than American aid to India...... The approximate total is £13,500,000 (*i.e.*, Rs. 180 crores) for 44 million people, a not inconsiderable sum for a country also dependent upon foreign aid for many of its development projects. Apart from direct aid, tens of millions of rupees are being spent by India on the improvement of the Pathankot Road and services taken over by the Indian authorities......even custom duty at Indian ports on imported goods is returned to the State in the form of an annual grant. The maintenance of Indian army in the State also brings in millions of rupees ......Aid is strictly a political operation with very obvious strings." The goal of Indian policy is to reduce the opposition in numbers through aid. If this goal is reached, then only

dangerously bad relations with Pakistan will remain......"

India No Longer Stands by Plebiscite Pledge. On July 9, 1955, India's Home Minister, Pandit Govind Valabh Pant, announced in unequivocal terms in Srinagar that India no longer stood by her pledge of a plebiscite in Kashmir. He said: "We made certain statements when Kashmir acceded to India, but when we made those statements, circumstances were different from what they are now. The time factor is very important. Many things have happened since then."

He had also declared that since the decision on the accession issue taken by the Srinagar "Constituent Assembly" was final and irrevocable, there was no question of Kashmir going away from India and that as to the only other way—the forces of bayonets—it could not go by that way either.

The Indian Prime Minister Pandit Jawahar Lal Nehru confirmed in the Lok Sabha on August 5, 1955, that Pant's statements on the future of Kashmir were "consistent" with the policy of the Government of India. "We cannot ignore the changing world....", he said.

India was reported to have sent more troops to the Azad Kashmir-Occupied Kashmir border. It was reported that before the statement given by the Bharati Home Minister, Pandit Pant, the Bharati army had started concentrating along the border and strengthened their positions.

Pandit Pant's utterances shocked and distressed those who had never ceased hoping that Indo-Pakistan relations would one day "emerge from mutual distrust and inveterate bitterness into correctness and cordiality.

A "No Plebiscite in Kashmir" campaign was designed to serve three purposes:

1. To strengthen the hands of the Bakhshi regime in Occupied Kashmir which leans heavily on the Government of India and to dishearten the vast anti-India section of the population there;
2. To create an impression that, along with other sections of the population in India, the Muslims are also solidly behind the Kashmir policy of the Government of India; or
3. To indicate to Pakistan that India is not in a mood to settle this question.

All-Parties Conference on Kashmir. The All-Parties Conference on Kashmir began towards the end of November, 1955. Top-ranking leaders of the various political parties including the minorities represented all sections of public opinion. It discussed the Kashmir Issue to evolve a plan to solve the complicated top-priority problem.

Policy of Pakistan. For Pakistan, Kashmir is of grave national importance. The longer its solution is delayed the more it agitates the minds of the people and the greater grows its importance.

Although fully alive to the first-rate importance of a just solution of Kashmir Problem, the Government of Pakistan continue to hold that the Kashmir Question needs to be decided in a cooler atmosphere and that the solution must be a peaceful one. Pakistan's case about Kashmir is very strong.

India Refuses Plebiscite in Kashmir. On March 29, 1956 the Indian Prime Minister, Mr. Jawahar Lal Nehru said in Lok Sabha that legally and constitutionally Kashmir had acceded to India and, therefore, it became India's duty to protect Kashmir from aggression and to drive out the invaders. He declared, "All this talk of a plebiscite is completely beside the point," for many new developments and changes had taken place during the previous eight years or so."

Pandit Nehru listed the charges that had taken place during the last eight years, as the U.S. military aid to Pakistan, the economic development of the State (Occupied Kashmir) and the coming into being there (Occupied Kashmir) of the Constituent Assembly, Pakistan's membership of the Baghdad Pact and the SEATO were stated to have increased danger to Bharat. Therefore, all old things about plebiscite became out of date.

On April 13, 1956, the Prime Minister of Bharat said in a public meeting that he had suggested to Pakistan that the Kashmir Problem should be solved on the basis of the existing cease-fire line after mutual discussions.

Views of Pakistan. The ex-Prime Minister, Mr. Muhammad Ali described the reported offer of Pandit Jawahar Lal Nehru to settle the Kashmir Dispute on the basis of the present cease-fire line as a 'preposterous proposal'. He said, "The

people of Kashmir are not goods and chattels which could be divided amongst India and Pakistan by the latter's agreeing on a partition of the State, as proposed by the Indian Prime Minister. The people of Kashmir demand the right of self-determination. They are bound to secure this right, however much the Indian Prime Minister may resist it."

Bharat had been perpetrating acts of violence in order to provoke and embarrass Pakistan. The idea behind border raids was apparently to impress the United States and Britain that the explosive situation existed on Pak-Bharat frontiers, and consequently they were playing with fire by giving arms aid to Pakistan.

Mr. Muhammad Ali stated that continuation of direct negotiations with Bharat "no longer holds any prospect" of settlement of the Kashmir Dispute and "this Dispute must now be referred to the Security Council." He rejected Pandit Nehru's statement that Pakistan's associations with SEATO and Baghdad Pact and US military aid amounted to a threat to Bharat and that it had changed the position of the Kashmir Dispute. He said, "Bharat had tried in the past to divert our attention from the Kashmir Question by inciting communal trouble in Bengal and to bully Pakistan by amassing armed forces against Pakistan." The same aggressive steps are being adopted by Bharat today. Apart from several border incidents that have taken place in quick succession, which are an evidence of Bharat's aggressive designs against Pakistan, it was reported that Bharat was planning to settle more non-Muslims in Kashmir and drive out its Muslim population in order to reduce it to an ineffective minority in the State.

Following Mr. Nehru's announcement that plebiscite has largely become out of question now, Pakistan decided to report to the Security Council the failure of direct negotiations.

World Press Views. The fortnightly *Free Thinker* of Delhi in an April issue criticised Nehru's stand on Kashmir as "definitely incompatible with promises of plebiscite". The journal said editorially that Mr. Nehru's contention that the State had acceded to Bharat did not stand scrutiny as the 'Assembly' was not an elected body and did not support an iota of popular support. Mr. Nehru's denial against the

solution of the dispute for reasons of Pakistan's membership of pacts and her getting military aid from the USA was unintelligible. The journal further observed: "So long as the country remains deprived of freedom and liberty, it cannot make any substantial progress in any fields."

An Urdu weekly, *Naya Payam* of Delhi said that in view of the fact that armies of the two countries were facing each other in Kashmir, Mr. Nehru's claim that by ruling out the plebiscite he would solve the Kashmir Issue was "patently absurd". So long as the Kashmiris were not allowed their right of self-determination Mr. Nehru's dream of ending uncertainty in Kashmir would never come true, the weely said.

U.K. Press sharply criticised Mr. Nehru on his Kashmir statements. The *Manchester Guardian* said that "Mr. Nehru can hardly complain if there is a new burst of excitement over Kashmir. His remarks have been provocative." To *Daily Telegraph* it was "depressing to find Mr. Nehru appealing to the authority of Messrs. Bulganin and Khrushchev to support his claim to Kashmir." "In all his policies Mr. Nehru has shown a tendency to speak in two voices. In one role he is a strong man, the leader of the Congress Party under which India was unified, which demanded—and obtained—the accession of the powerful princely States and which is now preferred to rattle sabres against Goa, Kashmir and Pakistan herself. In the other, he is the heir of mystic Gandhi and of his policies of passive resistance."

The Delhi correspondent of the London *Times* put the blame for war hysteria in Bharat on the shoulders of the Bharati Press because day after day it printed flaring headlines announcing each border incident as a new "Pakistan's aggression", and freely hinted fears of attack by Pakistan with that country's membership of SEATO and receipts of arms aid from the West.

Al-Hayat, an influential daily of Beirut, said that Bharat refused to honour Security Council's resolutions for holding a plebiscite in Kashmir "because she knows well that its result will not be in her favour, since the population is overwhelmingly Muslim and will accede to no other country but Pakistan." The paper added that Bharat occupied Kashmir by force and is running it as if it were a Bharati State. The paper concluded:

"Bharat is losing confidence of the world opinion because in resorting to force she does not so differ from those imperialist powers that aim at colonization and aggrandisement."

Draft Constitution for Occupied Kashmir. The draft of the Occupied Kashmir's constitution presented to the Srinagar 'Assembly' on October 10, 1956 aimed at "legalising the occupation of Kashmir by Bharat and continuation of this occupation."

The draft constitution laid down that no amendment should be moved to Occupied Kashmir's affiliation as the "state is and shall always remain part of India." It also provided that no amendment should be applicable in respect of the application of Bharati laws and Bharati Constitution to the Occupied Kashmir. Another significant provision in the draft was that the Head of State with the concurrence of the President of Bharat, could suspend the constitution, whole or in part, for a period of six months.

The draft, it was said, claimed to extend itself to all territories of the ex-Maharaja of Kashmir at the time of Partition of the subcontinent.

A bicameral legislature was envisaged in the draft. The Lower House, to be called the Legislative Assembly, was to have 100 members to be elected on the basis of adult suffrage by permanent residents of the State. Twenty-four seats would be left vacant for the population of Azad Kashmir, in the hope that Bharati occupation would in due course extend to that area. The Upper House to be called the Legislative Council would be elected by the Legislative Assembly and teachers and local bodies. It would have 36 members. Thirty would be elected—15 by Jammu and 15 by Kashmir. The remaining six members would be nominated by the Head of the State who would be called Sadr-i-Riyasat.

The Head of the State would be elected by a majority vote.

Draft Constitution Wholly Unacceptable to Kashmiri People. The draft of the Occupied Kashmir's constitution presented to the 'Assembly' was wholly unacceptable to Kashmiri people as stated by the Working Committee of the Kashmiri Democratic Union. An appeal was made to the Government of India to inquire into the "sorry state of affairs and to end this rule by terroristic methods." Resolution on

the draft constitution said: "The draft is reactionary, undemocratic and servile and its framers enjoy absolutely no representative character, and have no mandate or authority from the people of the State. Only a Constituent Assembly elected through democratic methods, can frame constitution."

KASHMIR CASE BACK AT UNO

On January 2, 1957, Pakistan officially asked for a meeting of the UN Security Council at the "earliest convenience" of the members to discuss the Kashmir Question. Pakistan's decision to refer the case of Kashmir Dispute back to UNO appeared to some a long delayed step and a rather belated recognition of realities. The request to convene a meeting of Security Council was made in a letter to the Council President by Malik Firoz Khan Noon, the then Foreign Minister of Pakistan.

The latter recalled the UNCIP Resolutions dated 13th August, 1948, and 5th January, 1949, whereunder the question of the accession of the State of Jammu and Kashmir to India or Pakistan was to be decided by means of a free and impartial plebiscite to be held under the auspices of the UN. Dr. Frank P. Graham, the UN representative for India and Pakistan, expressed the hope that "instead of the United Nations representative continuing to report difference to the Security Council, may assume the leadership of over 400 million people with the good-will and assistance of the United Nations, join in negotiating and reporting an agreement on Kashmir and thereby light a torch along the difficult path of the people's pilgrimage towards peace." Pakistan upholding the prestige and authority of the United Nations accepted the UN representative's suggestion and initiated direct negotiations with the Government of India with a view to resolving differences which were holding up implementation of the aforesaid international agreement. But during all this time the Government of India refused, on one pretext or another, to honour their international commitments which they accepted under the two abovementioned UNCIP Resolutions. Statements made by the Indian Prime Minister in the Indian Parliament on March 29, 1956, and a Press Conference on 2nd April, 1956, as well as his subsequent public utterances and the steps that the so-called

"Constituent Assembly" of Kashmir had taken in collusion with the Government of India in regard to future disposition of the State in direct contravention of the Security Council's resolution of 30th March, 1951, further forced Pakistan to the conclusion that continuance of direct negotiation between the Governments of Pakistan and India held out no prospect of settlement of this dispute.

On the other hand, the Indian Prime Minister's declaration regarding opposition to a plebiscite accompanied by the steps that were being taken by the Government of India unilaterally to "integrate" the State with India in utter disregard to the assurance given by the Government to the Security Council and the mounting unrest both inside and outside Kashmir, had combined to create an explosive situation which constituted serious threat to peace in the area. If the disputes pending in the Security Council for over nine years were not resolved immediately, the faith of the people inside and outside Kashmir would be shaken in the ability of the UN to secure international justice, and gravest consequences might ensue.

The Government of Pakistan, therefore, felt that the situation called for a firm and timely action by the Security Council. The UNCIP Resolutions dated 13th August 1948, and 5th January, 1949, which constituted an international agreement between India and Pakistan that the question of the accession of the State of Jammu and Kashmir to India or Pakistan would be decided by means of a free and impartial plebiscite under the United Nations auspices, were urged to be implemented without delay.

Four-Power Resolution on Kashmir. On February 14, 1957, Britain formally submitted to the United Nations Security Council a Four-Power resolution calling on Mr. Gunnar V. Jarring, of Sweden, to consult the Indian and Pakistan Governments on the Kashmir Dispute. The resolution was co-sponsored by Britain, Australia, Cuba and the United States. The resolutions gave Sweden's Gunnar Jarring wide terms of reference; to examine proposals which were likely to contribute to the achievement of demilitarisation or "to the establishment of other conditions of progress toward the settlement of the Dispute is also to keep in mind United Nations' Resolution, state-

ments by India and Pakistan and the proposal for the use of a temporary United Nations force." Mr. Jarring was authorised to visit the sub-continent and report not later than April 15, 1957. Both Mr. Dag Hammarskjoeld and Mr. Graham were requested to render him assistance.

Russian Veto. On February 20, 1957, the Soviet Union vetoed the Four-Power resolution inviting the President of the United Nations Security Council, Sweden's Mr. Gunnar Jarring to go to India and Pakistan to attempt a settlement of the Kashmir Problem.

The ex-President of Azad Kashmir Government, Sardar Abdul Qaiyum Khan, commenting on the Soviet veto said in Muzaffarabad on February 21, 1957, that Pakistan-Bharat tension suited Russian strategy of infiltration. It was only unrest and conflict, he added, that Communism strived for.

New Resolution. The United States, Britain and Australia submitted a new resolution immediately after Russia had used its so-called veto to block the original measure. The new resolution repeated the proposals likely to contribute to a settlement of the Kashmir Dispute.

The following is the text of the second draft resolution presented in the Security Council by Australia, the United Kingdom and the United States:

"The Security Council recalling its resolution of 24th January, 1957, its previous resolutions and the resolutions of the United Nations Commission for India and Pakistan on the Indo-Pakistan question—

1. Requests the President of the Security Council, the Representative of Sweden, to examine with the Governments of India and Pakistan any proposals which, in his opinion, are likely to contribute towards the settlement of the Dispute, having regard to the previous resolutions of the Security Council and of the United Nations Commission for India and Pakistan—to visit the sub-continent for this purpose—and to report to the Security Council not later than 15th April, 1957.

2. Invites the Governments of India and Pakistan to co-operate with him in the performance of these functions—and

3. Requests the Secretary-General and the United Nations' Representative for India and Pakistan to render such assistance as he may request.

Jarring Report on Kashmir. As directed in the Security Council resolution adopted on February 21, 1957, the United Nations Representative for Kashmir, Mr. Gunnar V. Jarring (the U. N. representative of Sweden) visited India and Pakistan in March-April, 1957. He reported failure of his mission to Bharat and Pakistan under a Security Council mandate. The report was submitted to the Secretary-General of the United Nations on April 29, 1957. Mr. Jarring revealed that Pakistsan had accepted but Bharat had rejected his suggestion to submit for arbitration whether or not Part I of the UNCIP Resolution of August 13, 1948 had been implemented.

The report stated that discussions were held by Mr. Jarring with both the Governments. He made a number of suggestions to both the Governments. During his conversations, the Government of India laid particular emphasis on the fact that, in their view, two factors stood in the way of implementation of the two UNCIP Resolutions. "The first of these was that Part I of the resolution of August 13, 1948, and in particular sections B and E had, in their view, not been implemented by the Government of Pakistan. The second of these impediments, which concerned rather Part II of the first resolution, was that the Government of India, which had brought the case before Security Council on January 1, 1948, felt aggrieved that the Council had so far not expressed itself on the question of what in their view was aggression committed by Pakistan or India." Mr. Jarring explained to the Government of India that the Security Council had properly taken cognisance of their original complaint. The Government of Pakistan maintained that Part I of the first resolution had been implemented in good faith and in full by them and that the time had come to proceed to the implementation of Part II.

In order to break the deadlock concerning Part I of the Resolution, Mr. Jarring inquired of the two Governments if they would be prepared to submit the question, whether Part I had been implemented or not, to arbitration. The Jarring Report said, "While the Government of Pakistan, after a certain hesitation, fell in with my suggestion in principle,

the Government of India, however, did not feel that arbitration, as outlined by me, would be appropriate."

Comments. The veteran Kashmiri leader Chaudhri Ghulam Abbas Khan said on May 1, 1958, that some parts of the report of Mr. Jarring were not only "mischievous in the meaning and import" but were also "much partial and definitely hostile to Pakistan." He could never visualise such a "hopeless and disappointing document by a person like Mr. Jarring," Ch. Ghulam Abbas added.

JARRING "FAILED". The *New York Times* said on May 3, 1957, that the United Nations Report by Mr. Gunnar Jarring, of Sweden, on Kashmir could be summed up in one word—'failure'. The leading article quoted the report as saying that Bharat "did not feel that arbitrations as outlined by me (Mr. Jarring) would be appropriate. It was held by New Delhi to be inconsistent with the rights and obligations of the Union of India in respect of the territory."

The *New York Times* said: "What this really means, of course, is that Bharat regards the case as closed."

It is not subject to arbitrament. The Security Council had previously authorised a free plebiscite as the proper means of settling the political status of the disputed area. This was blocked by Bharat which then proceeded to 'incorporate' the territory without any submission of its status to a free vote of the Kashmiris. "The issue was, and still is, whether the Kashmiris are to be allowed to determine their political future in a free election." "What is at stake is not Pakistan's body of commitment. It is Government of the Kashmiris by consent of the Kashmiris. Bharat has refused to put this to the test." Pakistan is willing. "Mr. Jarring has failed, but this failure does not absolve the Security Council of its responsibility." "This case cannot thus be closed if the United Nations is to preserve its prestige and its self-respect," observed the *New York Times*.

"Delhi has now started campaigning for a move to entrust to the International Court the legal aspect of the State's accession to India. How does this accord with the solemn pledges given by the Bharati Government to the Security Council that the Kashmiris themselves should decide the future of the State?" And if the International Court

were, in any case, to decide against Bharat, who then is to enforce the decision? Following Bharat's recent defiance of the Security Council, a tendency to relax and evade the Issue has become noticeable in the United Nations. "But the UN will soon be called upon to act upon Mr. Jarring's Report. It can be said now that nothing can be more dangerous than to put this Dispute in cold storage." After its reverses in the Suez Canal dispute, the United Nations can allow its will to be flouted again only at a serious cost of its dwindling prestige and effectiveness. It cannot keep on adopting its code of conduct to appease the unappeasable, to mollify the offender or to placate the powerful.

India's Stand on Kashmir. It was reported on March 18, 1957, that on the eve of the arrival of UN Mediator, Gunnar Jarring, the Indian President Rajendra Prasad outlining the Indian Cabinet's policy before the joint session of Parliament which met on that day said: "Jammu and Kashmir State is and has been a constituent State of the Indian Union since October, 1947, like other States which acceded to the Union."

The Prime Minister Pandit Nehru was also reported to have told the Congress Parliamentary Party that their stand on "Kashmir was based upon uncompromising opposition to the two-nation theory propounded by the Muslim League (defunct)." The Prime Minister added, according to a report: "We are not going to be guided by this theory. We have opposed and will continue to oppose it. Our whole stand on Kashmir is to oppose this theory."

Amplifying India's stand *vis-a-vis* Azad Kashmir, Mr. Nehru argued on March 25, 1957, that it was the whole State of Jammu and Kashmir which had acceded to India and therefore Azad Kashmir also formed part of India.

Hindu Migration to Kashmir Facilitated. It was reported on August 26, 1957, that the Government of India was encouraging Hindus to settle in Kashmir with loans and rehabilitation grants. The settlers in Kashmir got loans and rehabilitation grants totalling to some Rs. 6,000 each. They also got an amount of Rs. 1,900 each on their arrival in Kashmir and later on they were granted business loans and other grants.

It was reported on May 8, 1957, that the Plebiscite Front in Kashmir had expressed its "alarm and grave concern" on Kashmir being included in the North Zonal Council, an Indian merger plan, to end Kashmir's entity and individuality and to reduce its Muslim majority to an insignificant minority in the Zone's total population of over 40 million.

Bharat Built up Air Bases in Kashmir. It was reported on June 6, 1957, that Bharat was building its Air Force and chain of air bases were being built in various parts of the country. A whole string of occupied air-fields was being developed in the north-eastern region of Bharat in Occupied Kashmir and Ladakh. The Bharatis were developing a new air-field in the north-eastern region of Bharat in Occupied Kashmir and Ladakh. The Bharatis, it was reported, were developing a new air-field in the north-eastern frontier parts in order to be able to establish a shorter air route for linking Lhasa with Calcutta. Similarly, in the Ladakh region construction of a military base was going on. The air-field was renovated and expanded and was capable of receiving fairly large sized civil and military aircraft.

India's Protest Against Mangla Dam Project. On August 21, 1957, India protested to the United Nations Security Council over the Mangla Dam project of the President of the Security Council the Indian Ambassador said, execution of the project was "a further instance of consolidation by the Government of Pakistan of their authority over the Indian territory of Jammu and Kashmir which they continue to occupy by force." He said the Government continued "the exploitation of the resources of the territory to the disadvantage of the people of Jammu and Kashmir and for the benefit of the people of Pakistan."

Bakhshi Ghulam Mohammad, commenting on Mangla Dam Project said, Kashmir had never renounced her right to parts of "her territories now under illegal occupation of Pakistan and the cease-fire line dividing the State was not a permanent demarcating line of the State borders."

Referring to the Indian letter of August 21, 1957, about the Mangla Dam Project in Azad Kashmir, Pakistan's permanent representative to the United Nations told the President

of the Security Council on October 4, 1957, that if measures recently carried out by India in India-held Kashmir cannot be deemed to aggravate the situation in terms of the resolution of 1948, the Government of Pakistan fails to understand how a development measure undertaken in Azad Kashmir such as the Mangla Dam Project executed by Pakistan and the Azad Kashmir authorities could be described as a violation of the resolution.

Kashmir "Drifting Towards an Explosion."[35] Elizabeth Partridge in the *News Chronicle* from New Delhi said in September 1957, that Kashmir seemed to be drifting towards an explosion. "Tension has mounted to breaking point in Kashmir, that fairy land of lakes and lotuses which is the cause of dissension between India and Pakistan." "Warning of danger" is the unhappy keynote of Kashmir. "There is a grave risk of another dash, because tension is increasing as India buys surplus British arms to catch up with her neighbour's American arms aid."

"India has plenty of trouble in Kashmir. Until now India's puppet Prime Minister, Bakhshi Ghulam Mohammad has ruled with an ungloved iron hand. Because of the continuing emergency—at least two crack Indian divisions are still guarding Kashmir—civil liberties have been increasingly crushed. Now for the first time Bakhshi faces tough internal opposition and a great deal of his dirty linen is about to be washed in public. A section of his party, led by G. M. Sadiq and D. H. Dhar, has broken away to form their own party, accusing Bakhshi of corruption, nepotism and loss of freedom. Miss Mridula Sarabhai detailed in an Urdu newspaper of Jammu the rape outrages frequently perpetrated by sex maniacs in the Indian Military and Central Reserve Police. "Not only the National Conference rank-and-file but also the high ups in the party who are today the rulers of the State indulge in such activities," she stated.

UN Debate on Kashmir. The Kashmir case came up again to the Security Council on September 24, 1957. Pakistan's Foreign Minister told the Security Council that Pakistan was willing to withdraw her forces from the cease-fire line in Jammu and Kashmir, provided a strong United Nations Force occupied the area and provided India reduced her forces to the level

prescribed by the Security Council in its resolution of December 23, 1952.

Dr. Graham's Report. Dr. Graham visited India and Pakistan in February 1958. His report to the President of the Security Council was released in Pakistan on April 3, 1958. The report was divided into 7 parts and contained 13 pages. The report described in brief Dr. Graham's terms of reference and outlines of the dates and manner of his discussions with the Governments of India and Pakistan. His formal recommendations, which he finally made to the two Governments on February 15, 1958 included consideration of the possibility of a renewed declaration in accord with the 1948 declaration, to report the integrity of the cease-fire line, possibility of stationing of a UN force on the Pakistan side of the Pakistan and Kashmir border, need for an early agreement between the two Governments on the interpretation that should be placed on Part III of August 13, 1948 resolution.

Pakistan Accepted Recommendations. Dr. Graham mentioned in Part V of the report that the Government of Pakistan accepted each and every one of his proposals in principle while the Government of India rejected these all.

India Rejected. With regard to the recommendations on the stationing of a United Nations force on the Pakistan side of Jammu and Kashmir border, the Government of India expressed adverse views. She considered it as highly improper and indeed an unfriendly act to promote a suggestion which would involve the stationing of foreign troops in neighbouring sovereign state. The Government of India also did not like to discuss the view that there was need for an early agreement between the two Governments on the interpretation of 1948 resolutions. "The Government of India declared themselves unable to agree to my recommendations. They based their position on the grounds that my recommendations were made without regard to failure to implement the Security Council resolution of January 17, 1948, and clauses (*b*) and (*e*) of Part I of the UNCIP Resolution of August 13, 1948, for which they held Pakistan responsible. In their view, the sole onus of performance was on Pakistan and the United Nations, which has both the responsibility and capacity, for taking steps towards a peaceful approach to the

situation and for making a contribution to resolving difficulties between India and Pakistan.

"While, therefore, the inability of India to accept my recommendations primarily followed from their contention that my approach was not feasible since, in their view, it intended to bypass the implementation of what they considered to be the preliminary question, they also informed me that they did not look with favour on the substance of my recommendations.

Thus they felt that a new declaration regarding a peaceful atmosphere and cease-fire line might denote a displacement of previous engagements. They further contended that such a declaration would imply that Pakistan had not violated their previous engagements and that the consequence of them would thereby stand condemned.

"The Government of India could also not see their way to accept the stand I had recommended in my third recommendation as they felt that it would tend to by pass and evade what they considered to be the main issue, namely, illegal occupation of Indian Union territory by Pakistan.

"In their view that territory was an integral and inseparable part of the Union of India and the recommendation was based on a misconception that Jammu and Kashmir were a no-man's land. Further study in their view would not be relevant since according to UNCIP resolutions and assurance given on behalf of the Security Council to the Government of India they alone, with the UN, were concerned in this matter and Pakistan would not seem to have any place whatsoever in these arrangements."

Abdullah's Release and Rearrest. On January 8, 1958, after 4½ years of detention in jail without trial Sheikh Abdullah was released. Since his release from jail Sheikh Abdullah was staunchly demanding a free plebiscite in the State to determine its final destiny. He said that he was not prepared to recant his views on Kashmir's constitutional destiny and had emphasised that the whole problem of Jammu and Kashmir had to be left to the people themselves for solution.

Kashmir Liberation Movement (K.L.M.). The convention of the Central Kashmir Liberation Committee decided in their meeting on June 15, 1958, to launch a peaceful crossing

into the India-held Kashmir from the 9th or Zilhaj, *i.e.*, one day before Id-ul-Azha (June 27, 1958). It was resolved to continue it till their noble end was achieved. The resolution emphasised that the movement would be strictly peaceful and hoped that the people would not be provoked to violence.

The resolution stated in detail the origin of the Dispute, what led to the stalemate and how India had always blocked a peaceful settlement of the Dispute. It also blamed the UN Security Council for appeasing India. It also criticised the Government of Pakistan for having failed to pursue a vigorous and strong policy in securing the right of self-determination for the Kashmiris. The resolution also condemned India for reducing the State to an armed camp and unleashing a reign of terror on the helpless people, unknown in history. Ch. Ghulam Abbas had earlier declared: "No force on earth can stop Kashmir from breaking the cease-fire line."

The Government of West Pakistan arrested Ch. Ghulam Abbas Khan while he was on his way towards crossing the cease-fire line on June 27, 1958, according to the programme chalked out by the Kashmir Liberation Movement of Azad Kashmir people. In spite of the arrest and strong precautionary measures taken by the Pakistan and Azad Kashmir Governments several hundred volunteers were reported to have assembled at Chinari to cross peacefully the cease-fire line on June 27, 1958. By July 10, 1958, seven of the top leaders of the Movement were reported to have been arrested besides over 1,200 volunteers. The K. L. M. volunteers continued to cross the cease-fire line and the Movement was kept up by its next leaders. All the K.L.M. leaders were released by the New Regime in Pakistan.

All the leaders of the Occupied Kashmir are perpetually demanding free plebiscite. Even hardships in jails do not shake their determination. Some of them had died in jails offering life sacrifices for the freedom of their beloved country from the clutches of Indian tyranny.

PRESIDENT AYUB AND KASHMIR PROBLEM

The New Regime in Pakistan is specifically particular about the liberation of Kashmir. Field-Marshal Mohammad Ayub Khan stated at a Press Conference: "About Kashmir

the first thing to note is that, apart from any other consideration, from the purely military and country's security point of view, we have to continue the struggle for the liberation of the State of Jammu and Kashmir. In no case can we give up that struggle....We are going to try desperately to see that the Kashmir Dispute and the Canal Waters Dispute are settled justly and amicably to our satisfaction."

On October 6, 1960, the President of Pakistan stated that the Pakistan Army, as the defender of the motherland, could never afford to leave the Kashmir Issue unsolved for an indefinite time. A glance on the map of West Pakistan would show that the whole of this territory, as strategically described, was outflanked. Continuing President Ayub said, "Our Communications, our rivers and even the cease-fire line in Kashmir, one and all, are sufficient factors to indicate that our neck is in the grip of others." The President said that it was his endeavour that this Issue was solved peacefully with India. Crores of rupees were being spent both in India and Pakistan, which they could not easily afford as there was hunger and want in both the countries as legacy of the foreign rule. Under the arrangements made for the availability of water to Pakistan, the President indicated the solution of Kashmir Issue acquired a new sense of urgency.

The President of Pakistan while in Indonesia on State Visit on December 7, 1960, brought up the Kashmir question and strongly attacked India for its stand on the disputed State. While on State visit in Japan on December 14, 1960, the President called for a settlement of the Kashmir Question and said that there could be no lasting peace between Pakistan and India as long as their armies faced each other across the cease-fire line. He had also told in a meeting that the idea of Pakistan was conceived because 100 million Muslims in the Indian sub-continent felt very apprehensive and threatened by Hindu domination. He said that the Muslims feared that because of the rigid caste system of the Hindus they might become untouchables and fall from one slavery to another. After freedom, the Muslims found that their fears were just.

All sincere efforts by Government of Pakistan towards a peaceful and equitably just solution of the Kashmir Problem, as laid down in various U.N. Resolutions, have failed because of Indian refusals to come to a settlement.

The world organisation for peaceful settlement of international disputes in the UNO appears to have proved impotent in this regard and has failed to settle the dispute even within seventeen long years. The UN Representatives, Commissions and Mediators have come and gone back to Lake Success to report, in their leisurely drawn up learned reports, their failure to bring about a settlement. Big Powers appear to be interested in keeping up tension between India and Pakistan.

Kashmir Talks Failed. In pursuance of joint communique issued in November 1962, by the President of Pakistan and the Prime Minister of India renewed efforts at ministerial level were made to resolve outstanding differences between India and Pakistan over Kashmir so as to enable both the countries "to live side by side in peace and friendship." The Indian and Pakistan delegates held a number of meetings spread over six sessions between December 1962 and May 1963. But at the end of the last meeting the two Ministers (Sardar Swarn Singh and Mr. Z. A. Bhutto) recorded with regret that no agreement could be reached on settlement of the Kashmir dispute.

India was held responsible for talks' failure. Pakistan's External Affairs Minister made it clear on May 16, 1963 that his country could not accept a proposal for mediation over Kashmir unless it contained something concrete on the terms of reference and time-limit for mediation. India rejected Pakistan's plan. The Pakistan External Affairs Minister said, "We have clarified our proposal that the valley should be internationalised as an interim arrangement, say for six months. Thereafter the wishes of the people should be determined regarding future dispensation."

Pakistan Rejected Partition Plan. In April 1963, partition plan of the Valley of Kashmir between India and Pakistan came up from America when Mr. Rostow visited both the countries. This plan was understood to divide the Valley with its major portion remaining with India. According to the American plan, the dividing line ran behind the Srinagar-Leh Road, giving a small portion of the Valley and Ladakh to Pakistan while keeping the major portions, including Srinagar,

for India. Pakistan was understood to have politely rejected the plan.

Plebiscite the only Acceptable Solution. The All-Parties Kashmir Committee called upon the Government to make an unequivocal declaration that the only solution of Kashmir dispute, acceptable to the people of Pakistan was a free and impartial plebiscite under the United Nations auspices. From the very beginning of the Kashmir dispute Pakistan had maintained that the only just and peaceful solution of the Kashmir dispute was a free and impartial plebiscite, the solution acceptable to the Security Council and embodied in the United Nations resolutions. It was pointed out that any partition of the Jammu and Kashmir State so as to allow India permanent occupation of the Kashmir Valley or the area Disputed by China and India in Ladakh, would be a betrayal of the people of Kashmir.

Violations of UN Resolutions by India. On March 26, 1963 the External Affairs Minister of Pakistan listed eleven deliberate violations of the Security Council and United Nations Commissions resolutions on Kashmir committed by India.

1. Kashmir figures illegally as one of the States of India in the Indian Constitution in contravention of India's pre-existing international obligations. India is thus guilty of violation of the law of the United Nations and of International Law.

2. India attempted to secure popular approval of the fraudulent and invalid instrument of accession signed by the despotic Maharaja of Kashmir when his authority had been overthrown by a successful uprising of his long-suppressed people.

3. India set up a so-called Constituent Assembly in 1951 in violation of the Security Council resolution of 30th March, 1951. The manner of holding "elections" to this illegal body are only well-known to be recapitulated now.

4. India took steps in 1952 to bring about the administrative merger of Kashmir with India in violation of U.N. resolutions. An agreement known as the Delhi agreement, was signed that year. It covered such matters as residuary

powers, citizenship laws, fundamental rights, powers of the Supreme Court in relation to the State of Jammu and Kashmir, the application of emergency provisions embodied in the Constitution and the headship of the State.

5. India further tightened its grip over Occupied Kashmir by the promulgation of a Presidential Order in May 1954, which had the effect of extending the jurisdiction of the Indian Union over the State. The Presidential Order also modified the definition of the term "State subjects" and broadened its basis to include all persons who had acquired immovable property there. This was calculated to reduce the Muslim majority in the State, which had already been seriously affected by acts of genocide carried out in the Jammu province in 1947.

6. In April 1954, the customs barriers between Occupied Kashmir and India were abolished.

7. Indian Taxation laws in respect of income tax and customs and excise duties were extended to Occupied Kashmir.

8. Kashmir's financial integration with India, which was launched previous year, was completed in 1955 and the Auditor-General of India was empowered to exercise the same jurisdiction in Jammu and Kashmir as in other States.

9. In April 1955, other provisions of the Indian Constitution were made applicable to the State.

10. In November 1956, India began taking steps unilaterally to integrate the State with the Union of India with effect from 26th January 1957, in complete disregard of India's assurances to the contrary, solemnly expressed before the Security Council and in defiance of the Security Council's resolution of 30th March 1951. This occasioned the adoption of another resolution by the Security Council, on 24th January 1957, which reaffirmed the Council's resolution of 30th March 1957 and declared that:

"The convening of a Constituent Assembly as recommended by the General Council of the 'All Jammu and Kashmir National Conference' and any action that Assembly may have taken or might attempt to take to determine the future shape and affiliation of the entire State or any part thereof, or action by the parties concerned in support of any

action by the Assembly, would not constitute a disposition of the State" in accordance with the principles enunciated by the Security Council.

11. India went a step farther when, on April 23, 1957, it included the Jammu and Kashmir State in the membership of the Northern Zone Council Organization of India.

Pakistan's Protest Against Merger Move. The Government of Pakistan sent a note to the President of the Council in which the Security Council's attention was invited to the Indian merger move with regard to Held Kashmir.

Kashmir refugees in Pakistan staged angry demonstrations against merger of Held Kashmir with India. They expressed that Kashmiris would lay down their lives for their right of self-determination and they were ready to resume war of liberation. The Senior Vice-President of the Jammu and Kashmir Liberation League warned India that Kashmiri people would be compelled to resort to direct action if it ever attempted to merge Occupied Kashmir in the Indian Union.

Held-Kashmir Merger Move Illegal. In a statement issued on October 5, 1963, the President of Pakistan condemned the latest move to "integrate" the State of Jammu and Kashmir with India and said that in making these treacherous moves India has clearly drawn encouragement from the policies of certain great Powers. He said that the continuance of a large scale military aid to India from the United States and the United Kingdom has served only to embolden India in her defiant stand to trample underfoot the rights of the people of Kashmir. The President said that the latest move of integration of Jammu and Kashmir with India has taken over the years in defiance of the Security Council Resolutions on Jammu and Kashmir. This action he said "is clearly illegal". He pointed out that "it clearly shows India's contempt for the United Nations despite the fact that she is formally pledged to uphold its Charter and should serve to open the eyes of the world to the expansionist design of his neo-imperialism". Pakistan condemned and firmly rejected the move. He stated that while it would not alter the legal status of Kashmir so far as the Security Council or Pakistan or the people of Kashmir were concerned; it exposed

the policy of duplicity which India had throughout followed in regard to Jammu ana Kashmir.

"*Mischievous Move*". The *Pakistan Times* dated October 6, 1963 in its editorial stated Indian move to forge "full integration" of Occupied Kashmir with the Indian Union as "yet another piece of political aggression to be perpetrated on the people of the captive territory. India was first guilty of aggression when it fraudulently secured the instrument of accession from the discredited ruler of the State. As a cover, Indian spokesmen abroad have ever since been levelling the charge of aggression against Pakistan. Mr. Krina Menon repeatedly harped on this the me and the other days Mrs. Pandit took a leaf out of his book while addressing the U.N. General Assembly. Yet the world knows that India acted aggressively in 1947, and again in 1957 when it took initial steps to merge the State in the Union in clear defiance of the U.N. Security Council resolution. And now it is going the whole hog by planning to abrogate Article 370 of its Constitution. This Article grants special status to the State and limits the powers of the Lok Sabha to frame laws for its administration. Hitherto the Indian Parliament was obliged to secure the concurrence of the State Government in law-making and could cover only those subjects which 'correspond to matters specified in the instrument of accession." But now these 'temporary and transitional provisions' will go and the Indian Constitution will enjoy full supremacy over the disputed territory. The 'Head of S.ate' and 'Premier' will also be designated Governor and Chief Minister as in other States." It was stated that "fresh concentration of Indian troops on West Pakistan borders is not unrelated to these disturbing events in Kashmir". The editorial further stated "the full merger plan appears to have been hatched by India a decade ago when Shaikh Abdullah was removed and thrown into prison for trying to safeguard the autonomous status of the State and retain its separate flag anu the right to decide its own future. The Indian Premier got rid of Shaikh Abdullah but stayed his hand for he knew how to move step by step. If he did not go further then, it was because the odds were heavy and the threat of popular resistance in Kashmir could not be treated lightly. But having reinforced his military might and neutralised the Western Powers he has evidently felt em-

boldened to obliterate Kashmir's autonomous entity and swallow the State by making it a part of the Indian Union. This is a conspirational violation of the UN directives and solemn international commitments, to say the least....".

WAR OF LIBERATION

Establishment of Revolutionary Council in Occupied Kashmir. On August 8, 1965, a radio station "Sadai Kashmir" announced the establishment of a Revolutionary Council in Occupied Kashmir to lead an all-out war of liberation against the Indian imperialism.

Sadai Kashmir also announced the termination of all so-called agreements with India and declared: "The battle for freedom has begun. The Kashmiris must rise to a man to fight for their honour. We shall treat as traitors all those who betray the cause of freedom at this crucial moment in the history of Kashmir."

The establishment of the Revolutionary Council for Occupied Kashmir marked the 12th anniversary of the arrest of Sheikh Abdullah on August 9, 1953 for his refusal to accept India's colonial rule and for his insistence on the Kashmiris deciding their own destiny according to their wishes.

Kashmiri refugees residing in Pakistan observed black day on August 9, 1965 to condemn the arrest of Sheikh Abdullah and Mirza Afzal Beg.

The War of Liberation Launched in Occupied Kashmir. The freedom fighters in Kashmir on August 10, 1965 cut off the Srinagar-Jammu Road and captured a number of depots of foodstuffs and arms meant for the Indian Army.

"Sadai Kashmir" announced further that the freedom fighters had blown many bridges at different points besides setting fire to petrol depots.

Srinagar, Baramula, Uri, Poonch and Kargil became the main theatres of war between the freedom-fighters and the Indian Occupation Army. Srinagar was cut off from Leh and Baramula. It had already been isolated from Jammu on August 12, 1965.

The mujahideen killed several Indian soldiers and destroyed the entire military camp at Jaurian, near Akhnoor.

The Indian Home Minister, Mr. Gulzari Lal Nanda, who flew to Srinagar on August 12, 1965 described the situation as "quite serious". Fighting was going on in different sectors of Occupied Kashmir. He expressed disappointment over the cowardly performance of Indian troops and police in certain sectors where they suffered heavy casualties at the hands of freedom-fighters.

Truce Line Crossed by India. A large force of Indian troops, one thousand strong, attacked two posts of Azad Kashmir Force in Titwal sector on August 25, 1965. The occupants of the posts after putting up a brave fight against overwhelming odds and inflicting heavy casualties on the enemy, moved to their alternative positions.

India announced that her troops crossed the Kashmir Cease-fire Line at two points and established new positions.

The Government of Pakistan on August 25, 1965 strongly protested to India against the naked violation of the Pakistan territory on August 24 in which the Indian Artillery shelled a Pakistani village Awan in Gujrat district. Pakistan warned New Delhi of serious consequences that might ensue from that highly provocative action. Indian action in Awan was pre-planned. They had evacuated Chhamb civil population 3 weeks earlier.

Strong indignation at the heavy shelling of Awan village was voiced by the citizens of Pakistan. The people demonstrated their resentment and anger through statements and protest processions. They demanded that the Pakistan Government should meet the situation with such force as was necessary to resist the Indian war threats. They wanted the Government not to stand in the way of the Kashmiri people but enable them launch a full-fledged attack on the Indian occupation forces across the Cease-fire Line.

Students' meetings were held to voice strong resentment. The students demanded that the youth should be mobilised to meet the Indian Aggression forcefully. They believed

that mere protests to the Indian Government against the dastardly actions of the Indian Army would not help the situation. The Indians were determined to create trouble and their designs must be frustrated.

The Government of Pakistan kept informed its allies and other friendly countries of the world about India's aggressive activities. On August 24, 1965, the Indian Prime Minister threatened that India might resort to actions similar to the occupation of three Pakistani posts in Kargil elsewhere to stop "infiltration from Pakistan". The Indian Defence Minister, Mr Y. B. Chavan said in New Delhi on August 23, 1965 that India was ready to cross the Cease-fire Line in Kashmir, if necessary to defend it. She has done so "and I have no doubt we are ready to do so again."

India Extended War to Pakistan. On September 6, 1965 India extended war to Pakistan by launching a sneakish aggression in Lahore and Sialkot sectors. India marched on Pakistan without a declaration of war. This treacherous aggression of India on Pakistan is considered as unparallel in the history of mankind.

On September 6, 1965 the Indians made attempts to advance in the Lahore, Sialkot and Khem Karan sectors. But they had to run back in the face of stiff resistance and heavy causalties to them.

The enemy launched attacks three times in Maqboolpura in Lahore sector but all these attempts failed.

In Sind-Rajisthan sector on September 14, 1965 Pakistani troops captured another post. In Akhnoor sector Pak. troops had made further tactical gains. The enemy suffered heavy causalties both in men and material.

Up to second week of September, Pakistan Army was in control of about 500 square miles of Indian territory in various war fronts.

The area surrendered by Indian Army to Pakistani troops included 200 square miles in the Chhamb-Jaurian sector, 80 square miles in Khem Karan sector and over 200 miles in the Rajasthan sector.

Historic Clash in Sialkot Sector. The General Officer Commanding of the Sialkot battle front said at Sialkot on September 19, 1965 that India's deployment of the bulk of her armour in the Sialkot sector had been countered with determination. It was an historic confrontation between armour and determination.

The GOC said that the terrain around Sialkot was an excellent tankable area. The failure of monsoons during the season had further made it fit for tank movement and manoeuvring.

The Indians, he said, had all along marked it as a battle-field. They had, therefore, constructed roads and communications on their side of the disputed territory. In their plan of aggression Sialkot was an important point and they wanted to fight a decisive battle there.

Pakistan was not taken by surprise when the enemy launched an attack on her front. Anyone who takes offensive, however, has the advantage of the initial few miles. But apart from this the Indians had not been able to make any gains and there were signs that their retreat had started.

"We are administering further blows to the enemy and, 'Insha Allah, the outcome of the battle would show to the world that aggression does not pay." He added that the PAF was busy playing havoc with enemy armour and enemy planes were rarely sighted.

The losses suffered by Pakistanis were in the ratio of one to five Indian casualties both in armour and men.

World Supports Kashmiris' Self-determination Right. The struggle of the shackled Kashmiri Muslims, culminating in the armed uprising in the State of Jammu and Kashmir found sympathy and support in the columns of leading British and American dailies, notwithstanding Indian 'infiltration' charge against Pakistan. "The New York Times" in an editorial belied the oft-repeated Indian charge of 'infiltration' from Pakistan that infiltors could hardly have made their way so far from the Cease-fire Line—in some cases more than 40 miles—without help from the local population. The Daily said that the Muslim Kashmiris had little love for India, and there was substantial support for union with Pakistan.

"*The Herald Tribune*" on August 16, 1965 in its editorial said "Pakistan has a good case and claim to Kashmir than India. There are already enough fires burning full draught in Asia, and another major conflict might well destroy any remaining possibility of containing and limiting all the others in the area." "*The Milwankee Journal*" on August 17, 1965 wrote "India has refused to allow the people to hold a plebiscite, to which it once agreed, and determine whether to join India or Pakistan."

Wide Support for Pakistan. On September 9, 1965 *i.e.*, within three days of the Indian aggression against Pakistan, seven countries had announced their support to Pakistan in unequivocal terms.

The People's Republic of China condemned the Indian Government's naked aggression and termed the existing attitude of India as clear violation of all principles guiding international conduct which threatened peace.

President Soekarno, while announcing that Indonesia was taking sides with the people of Kashmir and Pakistan, called a special session of the Koti (Supreme Operational Command) to discuss what kind of help Indonesia would send to Pakistan.

The Prime Minister of Pakistan's RCD partner, Iran, Mr. Amir Abbas Hoveida reached Ankara to discuss the situation arising from the Indian aggression on Pakistan with Turkish officials.

The people of Iran also expressed their deep concern over India's aggression against the "homeland of their Pakistani brothers." They had announced that they "would not fail to extend every possible assistance to their Pakistani brothers and sisters."

The Turkish Prime Minister said that the sufferings of the Pakistani people in the prevailing Indian aggression against Pakistan were shared by the Turkish nation. He said that Turkey was seriously worried by India's action of spreading armed conflict from Kashmir to Pakistan and the bombing of Pakistani cities.

Indian Master Plan for Invasion of East Pakistan. The discovery of an Indian master plan for the invasion of East Pakistan was revealed by an official spokesman.

The plan found in the papers left behind by the Indian Army officers on the West Pakistan front, provided for a multiprong attack on East Pakistan after "overrunning West Pakistan in 72 hours."

Indian forces were employed in battle positions around East Pakistan, and some of the specially equipped mountain divisions, ostensibly held in reserve for use against China, were actually intended for an assault on East Pakistan.

In preparation for the assault, India had a five-mile attack belt around East Pakistan cleared of all civilians on the pattern of what she had done along the borders of West Pakistan. As a warning up process she stepped up her violations of the East Pakistan borders.

As a softening up operation, India bombed several places in East Pakistan and dropped saboteurs in certain areas of the province to prepare for the actual invasion.

The invasion was to be in implementation of India's long-standing designs against East Pakistan, as publicly proclaimed in the Indian Lok Sabha.

Cease-fire Resolution. On September 20, 1965 the 11-Member Security Council called for a cease-fire in the Indo-Pakistan fighting "as a first step towards a peaceful settlement of the outstanding differences between the two countries on Kashmir and other related matters."

The resolution, tabled by the Netherlands, provided for steps to be undertaken for a settlement of the political problems underlying the prevailing conflict and withdrawal of all armed personnel back to the positions held on August 5, 1965.

The resolution requested the Secretary-General to provide necessary assistance to ensure supervision of the cease-fire and to exert every possible effort to give effect to the resolution to seek a peaceful solution and to report to the Security Council thereon.

Text of the Resolution. The following is the text of the Security Council resolution on the Indo-Pakistan fighting:

"The Security Council, having considered the reports of the Secretary-General on his consultations with the Governments of India and Pakistan.

Commending the Secretary-General for his unrelenting efforts in furtherance of the objectives of the Security Council's resolution of September 4 and 6 of 1965;

Having heard the statements of the representatives of India and Pakistan;

Noting the differing replies by the parties to an appeal for a cease-fire as set out in the report of the Secretary-General (S/6683), but noting further with concern that no cease-fire has yet come into being;

Convinced that an early cessation of hostilities is essential as a first step towards a peaceful settlement of other related matters;

1. Demands that cease-fire should take effect on September 23, 1965, and called upon both Governments to issue orders for a cease-fire at that moment and a subsequent withdrawal of all armed personnel back to the positions held by them before August 5, 1965;

2. Requests the Secretary-General to provide the necessary assistance to ensure supervision of the cease-fire and withdrawal of all armed personnel;

3. Calls on all States to refrain from any action which might aggravate the situation in the area;

4. Decides to consider as soon as operative paragraph 1 of the Council's resolution 210 of September 6 has been implemented, what steps could be taken to assist towards a settlement of the political problem underlying the present conflict, and in the meantime calls on the two Governments to utilise all peaceful means, including those listed in article 33 of the Charter, to this end;

5. Requests the Secretary-General to exert every possible effort to give effect to this resolution to seek a peaceful solution.

The resolution was passed by 10 votes, with Jordan abstaining. It was evolved after day long discussions by the Big Powers principally the United States, Britain and Russia.

The Pakistan Law Minister had asked earlier to reject the resolution as it only provided for direct talks. He had

pointed out that India was not prepared to negotiate. He had emphasised that the Council must call for self-determination in Kashmir. He added that if India were allowed to get away with her usurpation of Kashmir "there would be no end of Colonialism."

The Indian delegate to the U.N., Mr. Chagla, told the Council that while his Government were prepared to accept the cease-fire, the rest of the resolution dealing with negotiations of the Kashmir dispute was not acceptable. He referred to his own earlier statements and Mr. Shastri's letter to U. Thant maintaining that Kashmir was an integral part of India and there was, thus, no question of negotiations.

The Jordanian delegate supported Pakistan position by emphasising that the basic UNCIP resolution on Kashmir should have been included in the present resolution. He asked as to whether the Council was on the threshold of burying these relevant and pertinent resolutions.

France, Holland and Ivory Coast also underlined the necessity of tackling the basic problem of Kashmir after the achievement of cease-fire.

The Big Powers were interested in setting up of a time limit for a cease-fire. Their interest in a cease-fire was inspired principally by the consideration that once this was achieved they could resume their military aid to India.

Pakistan Accepted Cease-Fire. On September 23 from 3 a.m., President Ayub in a special broadcast to the nation announced that while accepting the Cease-fire in the interest of world peace Pakistan would keep its forces in their existing battle positions for the time being.

President Ayub said: "World Powers have given us firm assurance of their awareness of the gravity of the Kashmir dispute and of the urgency to resolve it. If they fail in this, this continent will again be engulfed in a much wider conflict. The United Nations is on trial."

Paying glowing tributes to the skill and valour of the Armed Forces, the President remarked: "By his faith in God and in his cause and by his indomitable courage and superb craftsmanship the fighting man of Pakistan has written in his blood a golden chapter in the history of Islam

Indian myth shattered. Pakistan had not only been saved but also the myth of India's armed might had been shattered. The whole world had come to acknowledge the just and moral basis of Pakistan's struggle which she fought for the right of sef-determination of a people.

President Ayub warned the Nation to be vigilant. "Let us mention our Unity and our Resolve. Let us not forget for a moment that the struggle is not yet over. Let every one in East and West Pakistan remain prepared and vigilant. I am deeply conscious of your feelings but we must do nothing to disturb the image of a united and disciplined nation which you have presented to the whole world. The world cannot resist the moral forces which you have released. And the goal, though it might appear distant, is nearer than ever before."

Resolution inadequate and unsatisfactory. The President said that he had taken this decision in the interest of world peace although the Security Council's resolution of September 20, 1965 was both "inadequate and unsatisfactory." He added that Paksitan had received firm assurances from World Powers of their awareness of the gravity of the Kashmir situation and the need of taking concrete steps to solve it.

Pakistan was aware of the general inadequately of the resolution passed by the Security Council, but it was a great step towards reopening the issue and making an effort to find its solution.

The resolution is regarded as a "vital stage in the achievement of a peaceful solution of Kashmir." The continuance of the armies of the two countries in battle position would provide a sense of urgency and there would be no excuse that sufficient time had passed to blur either the promises or the issue itself.

The draft regretting the delay in the full achievement of a complete and effective cease-fire, and a prompt withdrawal of personnel to Aug. 5 positions called in the Security Council resolutions of September 4, 6, 20 and 27, 1965: (Numbers 209, 210, 211 and 214).

1. Reaffirms its resolution of September 20, 1965 number 211 in all its parts;
2. Requests India and Pakistan to co-operate towards

a full implementation of Paragraph One of the resolution of September 20, 1965, calls upon them to instruct their armed personnel to co-operate with the United Nations and cease all military activity and insists that there be an end to violations of the cease-fire ;

3. Demands the prompt and unconditional execution of the proposal already agreed to in principle by the Governments of India and Pakistan for a meeting of their representatives with suitable representatives of the Secretary-General, appointed without delay after consultations with both parties, for the formulation of an agreed plan and schedule for the withdrawals by both parties, and urges that such a meeting shall take place as soon as possible and that such a plan contains a time limit on its implementation, and requests the Secretary-General to report on the progress in this respect within three weeks of the adoption of this resolution;

4. Requests the Secretary-General to submit for its consideration as soon as possible a report on compliance with this resolution.

Step forward in Kashmir Solution. The Pakistan Foreign Minister, Mr. Z. A. Bhutto told a press conference at Rawalpindi on October 11, 1965 that the recent resolution of the Security Council was a step forward towards the settlement of the Kashmir dispute.

He said that although the resolution was merely a reaffirmation of the earlier resolution of September 20, 1965 Pakistan was satisfied with its adoption, as the Security Council had reiterated all the parts of the previous resolution despite India's bitter opposition.

TASHKENT DECLARATION AND THEREAFTER

Pakistan and India agreed on January 10, 1966 at Tashkent Declaration, with the Soviet Union as witness, to evolve a machinery for continuing negotiations (both at the highest and other levels) to settle their disputes peacefully.

Both recognised the need to set up joint Indo-Pakistan bodies which would report to their Governments in order to determine what further steps should be taken for that purpose.

Meanwhile, they agreed to withdraw their armed personnel to August 5, 1965 positions by February 25, 1966 and observe "cease-fire terms on the cease-fire line" and to restore normal functioning of diplomatic missions by returning their respective High Commissioners to their posts.

Other decisions of the summit talks, which concluded on a note of amity were that both would carry out repatriation of prisoners of war, return assets taken over by either side in connection with the conflict, discourage propaganda against each other, and consider measures for the restoration of economic and trade relations and communications and cultural exchanges.

The Tashkent Declaration was signed by the two Heads of Governments. Premier Kosygin who wished that the Declaration would serve as a "symbol of eternal friendship between Pakistan and India" and would help strengthen the two countries' relations with the Soviet Union.

The Declaration made special mention of the Jammu and Kashmir Dispute, which was a major subject of discussion both in the bilateral talks and informal exchange of views between the three Heads of Governments and which survived many a pitfall in the summit talks. The document also spelled out the background against which this basic cause of conflict between the two countries was discussed.

Both agreed to exert all efforts to create good-neighbourly relations in accordance with the Charter of the United Nations which placed the two under obligation not to resort to force and settle their disputes through peaceful means. They considered that the interests of the two peoples were not served by the continuance of Indo-Pakistan tension. It was against this background that the Declaration said that the Jammu and Kashmir Issue was discussed.

January 10, 1966, was the day which produced results. Otherwise the summit appeared to be in the doldrums and the prospects of even a joint statement had receded. Premier Kosygin made all efforts to save the summit and he was personally engaged in it continuously for 15 hours. The Declaration was finalised early that morning when he concluded his talks with late Prime Minister Shastri one hour

after midnight. The last meeting with President Ayub was at dinner, which the latter gave in honour of the Soviet Delegation. Final touches to the draft of the Declaration were given after the Soviet leader had his meeting with late Mr. Shastri.

It is interesting to note that the talks were concluded without any formal agenda for the Conference and the entire agreement was reached behind the scenes. Since their arrival in Tashkent, President Ayub and Prime Minister Shastri had only two bilateral meetings, one on the opening day of the Conference and the other on the following day. For the rest of the week, the two leaders could not get to the Conference table but had social *tete-a-tete*. In the meantime the brunt of the negotiations was mainly borne by Premier Kosygin.

Full Text. Following is the text of the Tashkent Declaration signed by President Ayub Khan of Pakistan and late Prime Minister Lal Bahadur Shastri of India.

"The Prime Minister of India and the President of Pakistan, having met at Tashkent and having discussed the existing relations between India and Pakistan hereby declare their firm resolve to restore normal and peaceful relations between their countries and to promote understanding and friendly relations between their peoples. They consider the attainment of these objectives of vital importance for the welfare of the 600 million people of India and Pakistan.

"The Prime Minister of India and the President of Pakistan agree that both sides will exert all efforts to create good-neighbourly relations between India and Pakistan in accordance with the United Nations Charter.

"They reaffirm their obligation under the Charter not to have recourse to force and to settle their disputes through peaceful means. They considered that the interests of peace in the region and particularly in the Indo-Pakistan subcontinent and, indeed, the interests of the peoples of India and Pakistan were not served by the continuance of tension between the two countries.

"It is against this background that Jammu and Kashmir Issue was discussed, and each of the sides put forth its respective position.

"The Prime Minister of India and the President of Pakistan have agreed that all armed personnel of the two countries shall be withdrawn, not later than February 25, 1966, to the positions they held prior to August 5, 1965, and both sides shall observe the cease-fire terms on the Cease-fire Line.

The Prime Minister of India and the President of Pakistan have agreed that relations between India and Pakistan shall be based on the principle of non-interference in the internal affairs of each other.

"The Prime Minister of India and the President of Pakistan have agreed that both sides will discourage any propaganda directed against the other country, and will encourage propaganda which promotes the development of friendly relations between the two countries.

"The Prime Minister of India and the President of Pakistan have agreed that the High Commissioner of India to Pakistan and the High Commissioner of Pakistan to India will return to their posts and that the normal functioning of diplomatic missions of both countries will be restored. Both Governments shall observe the Vienna Convention of 1961 on diplomatic course.

"The Prime Minister of India and the President of Pakistan have agreed to consider measures towards the restoration of economic and trade relations, communications as well as cultural exchanges between India and Pakistan, and to take measures to implement the existing agreements between India and Pakistan.

"The Prime Minister of India and the President of Pakistan have agreed that they give instructions to their respective authorities to carry out the repatriation of the prisoners of war.

"The Prime Minister of India and the President of Pakistan have agreed that the sides will continue the discussion of questions relating to the problems of refugees and evictions of illegal immigrations. They also agree that both sides will create conditions which will prevent the exodus of people.

"They further agreed to discuss the return of the property and assets taken over by either side in connection with the conflict.

"The Prime Minister of India and the President of Pakistan have agreed that both the sides will continue meetings both at the highest and at other levels on matters of direct concern to both countries. Both sides have recognised the need to set up joint Indian-Pakistani bodies which will report to their Governments in order to decide what further steps should be taken.

"The Prime Minister of India and the President of Pakistan record their feelings of deep appreciation and gratitude to the leaders of the Soviet Union, the Soviet Government and personally to the Chairman of the Council of Ministers of the USSR, for their constructive, friendly and noble part in bringing about the present meeting which has resulted in mutually-satisfactory results. They also thank the Government and the people of Uzbekistan in their sincere thankfulness for their overwhelming reception and generous hospitality.

"They invite the Chairman of the Council of Ministers of the USSR to witness this Declaration."

A Good Beginning at Tashkent. President Ayub told correspondents of *Tass*, *Pravda* and *Izvestia* that he regarded the Declaration as a "good beginning, for the establishment of normal and neighbourly relations between Pakistan and India."

He said that he would have been happier if attempt had been made in the Tashkent talks to resolve the Kashmir Dispute, but he certainly hoped this would lead to the relaxation of tension between the two countries and open the way for the solution of the main problem of Kashmir that has caused the recent armed conflict between Pakistan and India.

Once this problem was solved, President Ayub said, Pakistan and India would be able to establish stable peace in the sub-continent. The President said the Soviet Prime Minister, Mr. Alexei Kosygin had shown a unique example of statesmanship and far-sightedness in convening the Tashkent meeting. Their initiative, he emphasised, showed the Soviet Union's genuine interest in peace.

Russian Premier on Declaration. The Soviet Premier Mr. Alexei Kosygin said, after the Tashkent Declaration by President Mohammad Ayub Khan and Premier Lal

Bahadur Shastri, that "the talks were difficult, and it could not have been otherwise."

Talking to a group of Soviet journalists, Mr. Kosygin added, "It should be recalled that the discord between India and Pakistan is the heritage of the long domination of colonialists who set the enslaved peoples against each other.

The Soviet leader said that the implementation of the Tashkent Declaration will hinge on the skill and statesmanship of those who will translate it into life.

The Declaration, he added, "lays down real foundations for the creation of conditions of peace in this most important part of Asia."

[illegible] The talks were difficult, and it would [illegible] increase.

Talking to a group of Soviet journalists, Mr. Khrushchev said: "It should be realized that the disputed Soviet lands and Poland [illegible] the hostages of the long discussions of [illegible] against each other."

The Soviet leader said that the implementation of the [illegible] Declaration will hinge on the [illegible] and [illegible] those who will translate it into life.

As [illegible] was done [illegible] real foundations the [illegible] of [illegible] peace in the [illegible] Asia.

PART XIII

CURRENT TOPICS

1

THE INDUS BASIN WATERS TREATY
(1960)

A Treaty governing the use of the waters of Indus system of rivers, entitled "The Indus Basin Waters Treaty 1960", was signed on September 19, 1960, in Karachi between India, Pakistan and the World Bank.

Historical Background

Story of the dispute. The story of Indo-Pak canal waters dispute started virtually with the birth of Pakistan. Indeed it started even before that—with the Radcliffe Boundary Award which rather unaccountably gave India the control of rivers which were lifeblood of Pakistan. Besides laying the foundations for other disputes between Pakistan and Bharat, the Radcliffe Award also crippled a part of the gigantic canal system upon which depends the prosperity of an extensive area of the Indus Basin.

The first step to starve Pakistan came on April 1, 1948 when Bharat turned off the tap and Pandit Nehru demanded an acknowledgement by Pakistan that she had no right to the waters and, in effect, that Bharat could in future again appropriate Pakistan's share without recourse to the law. Pakistan, in the exigencies of the situation, signed on May 4, 1948, an interim arrangement which required her to deposit in Reserve Bank of India such "*ad hoc* sum as may be specified by the Prime Minister of India," but provided for a restoration of the flow without prejudice to the rights of either side. Bharat and Pakistan both agreed to examine the legal questions and to meet again to reach a permanent solution.

In July, 1948, Bharat proposed to convert the interim arrangement of May 4, 1948, into a permanent agreement. Pakistan refused to renounce her rights in this way. On October 18, 1948, Bharat telegraphed that she now construed the interim arrangement of May 4, as a permanent

renunciation by Pakistan of her legal rights adding that any further negotiations should be on the basis of Pakistan accepting this interpretation and advanced a threat that Bharat would again cut off the canal waters. Later on, however, Bharat agreed to a new conference unconditonally which took place in August, 1949, without any rsult. Next meeting was to take place in March 1950.

Bharat rejected Pakistan's plea that the allocations of water authorised before Partition be respected pending decision of the rights of the parties by the International Court of Justice to which Pakistan offered to refer the case.

Negotiations conducted by Pakistan with India and efforts towards a settlement were inconclusive. India declined to submit the dispute to international arbitration. She continued constructing irrigation projects so as to take off more supplies from the eastern rivers. The opening of Bhakra Dam, construction of new Headworks at Harike, conversion of non-perennial canals into perennial canals, progressive increase in irrigation acreage under Bharat's Five-Year Plans, etc., were examples in this regard. Consequently, no settlement could be reached with India.

Water allocations. *Before Partition* the water resources of the western portion were allocated on the basis of providing in the Basin of the Indus greatest good to the greatest numbers. As new projects were developed, the principle was also recognised that it does greater harm to cut off traditional supplies of areas which have put the water resources to use than to refuse new allocations of water, to new projects ; limitations were placed on supply of water, to new projects so as not to affect adversely the existing supplies of water.

After Partition, when the boundary between Bharat and Pakistan was drawn, an agreement was reached that the shares of water then allocated to the area, which became Bharat, would not be changed. Partition Committee "B" (of Arbitral Tribunal) which was charged with the question of future management of joint assets, stated in July, 1948, that: "The Committee is agreed that there is no question

of varying the authorised shares of water to which the two zones and the various canals are entitled."

Legal position. According to international law and the practice prevailing in other advanced countries, Pakistan was not only entitled to supplies of water which she used to get prior to Partition but she has also the right to share equitably the increased use of the waters of these rivers which might be made possible by future engineering works. However, Bharat insisted that she had a right to control the waters which pass through its territories. The convention of other international rivers, such as the Danube, the Nile, the Colorado and the Rio Grande was lost sight of by Bharat. She was not prepared to allow Pakistan equitable apportionment of water of the Indus Basin. That was the reason why she had been avoiding to put the whole case before the International Court of Justice at The Hague, which had been suggested by Pakistan several times.

Violation of International Obligations. Bharat's action was in violation of her obligations as a member of the U.N. "The withholding of water essential in an arid region to the survival of millions of its inhabitants is, in view of Pakistan, an international wrong as a peculiarly compelling use of force contrary to the obligations of membership in the U.N. Any concession obtained by such means cannot confer upon the offender any enforceable rights."

World Bank activities. In 1951, the International Bank for Reconstruction and Development (I.B.R.D.) offered to assist India and Pakistan in reaching a solution based upon a proposal put by Mr. Lilienthal, former head of the seven States Tennessee Valley Authority and ex-Chairman of the United States Atomic Energy Commission. The gist of the proposal was that Pakistan's existing use of water should be confirmed by India provided it worked with India in a joint use of the river basin on an engineering basis that could assure India's future as well. He suggested that "new engineering works be jointly financed, perhaps with the World Bank's aid." But their efforts also did not produce tangible results. The World Bank indicated that it would lend its good offices and consider

any financial proposals that might be developed as a result of joint planning on the basis of the Lilienthal proposal. Pakistan accepted the proposal.

At the instance of the International Bank, an Indus Basin Working Party, consisting of Indian, Pakistani and World Bank engineers surveyed and studied together the possible technical measures for increasing the water supply now available for irrigation to both the countries from the Indus System of rivers, taken as a unit. They had been touring India and Pakistan for some time to see irrigation works and assess the water supply requirements of the Indus Basin on both sides of the border. The data was required for the preparation of a comprehensive plan for the development of the waters of the Indus Basin, treated as a unit. The plan was proposed to be on the lines suggested by Mr. David E. Lilienthal, who visited the sub-continent in 1951.

In September, 1953, Pakistani and Bharati representatives began a series of meetings with the International Bank officials designed to work out a plan for greater utilisation of waters of the Indus River Basin which lies in both the countries. The International Bank officials thought it would take a number of months for the conference to reach an agreement.

World Bank proposals. On February 5, 1954, the International Bank for Reconstruction and Development made clear-cut proposals to Pakistan and India for the solution of the canal waters dispute. These proposals were to become the basis of future negotiations for an equitable and permanent settlement of the dispute. Briefly, the proposals were :

(i) that Pakistan should have the exclusive use of the three western rivers—Indus, Jhelum and Chenab; and India, the exclusive use of three eastern rivers—Ravi, Sutlej and Beas; (ii) that for a transitional period of about five years India should continue to supply Pakistan with water from the eastern rivers; and (iii) that India should bear the costs of building link canals in Pakistan to

replace supplies from these rivers "to the extent of benefit derived by her therefrom." India accepted these proposals almost immediately. Pakistan, however, did not accept the view that waters of the western rivers were sufficient for her needs. It accepted the proposals later with certain qualifications.

Agreement reached. There, then, followed more than four years of discussion and negotiation in Washington between the parties under the auspices of the World Bank. By May 1959, the main issues standing in the way of a settlement had crystallized and Mr. Black and Mr. Iliff of the World Bank visited New Delhi and Karachi to hold conferences with the Prime Minister of India and the President of Pakistan. In the course of this visit, an agreement was reached on the general principles on which a water treaty should be based, including the system of works to be constructed as part of the settlement and the financial contribution to be made by India. At the Washington conference, the World Bank officially announced that the Pakistan-India agreement on the Indus Basin would be signed in Karachi on September 19, 1960.

THE TREATY

The preamble of the Treaty recognised the need for fixing and delimiting, "in the spirit of goodwill and friendship, the rights and obligations of the Government of India and Government of Pakistan concerning the use of the waters of the Indus River System.

The water distribution between India and Pakistan is as follows :—

Allocation of water to India. The Treaty allocates the waters of the three eastern rivers—the Ravi, the Beas and the Sutlej—to India with certain exceptions specified in the Treaty. The main exception is that during the Transition Period of 10 to 13 years, while the works are being constructed in Pakistan for the replacement of eastern river waters, India will continue to deliver water to Pakistan from the eastern rivers in accordance with

a schedule set out in an Annexure to the Treaty. After the Transition Period of 10 to 13 years, Pakistan will have no right to releases by India of any waters of the three eastern rivers. India will, thereafter, be their sole master.

Out of the waters of the three western rivers, India will be entitled to the following restricted uses in the case of each of the rivers, the Indus, the Jhelum and the Chenab, to the drainage basis thereof.

(*a*) Domestic use ;

(*b*) Non-consumptive use ;

(*c*) Generation of hydro-electric power ; and

(*d*) Agricultural use (as detailed below).

India may withdraw from the Chenab Main such waters as India may need for agricultural use on the following canals limited to the maximum withdrawals noted against each :—

Name of canal	*Maximum withdrawal for agricultural use*
(*a*) Ranbir Canal	1,000 cusecs from 15th April to 14th October, and 250 cusecs from 15th October to 14th April.
(*b*) Partap Canal	400 cusecs from 15th April to 14th October and 100 cusecs from 15th October to 14th April.

If India should construct a barrage across the Chenab Main below the head regulators of the two canals, the withdrawals shall be determined by the Commission in accordance with the sound irrigation practices or under special provisions made in this regard in the Treaty.

Apart from the irrigation from the Ranbir and Partap Canals, India may continue to irrigate from the western rivers those areas which were so irrigated on the effective date.

India may make further withdrawals from the western rivers to the extent India may consider necessary to meet

the irrigation needs of the areas specified below :—

				Acreage
(a) From the	Indus,	in its drainage basin		70,000
(b) ,,	Jhelum	,,	,,	4,00,000
(c) ,,	Chenab (i)	,,	,,	2,25,000
	(ii)	outside	,,	6,000

Allocation of waters to Pakistan. The waters of the three western rivers—the Indus, the Jhelum, and the Chenab—are for the use of Pakistan. India undertakes to let flow for unrestricted use by Pakistan all the waters of these three rivers, subject to the Treaty provisions that some of these waters may be used by India in areas upstream of the Pakistan border for the development of irrigation, electric power and certain other uses partly mentioned above and spelled out in detail in Annexures to the Treaty.

As stated above, during the Transition Period, India will continue to deliver water to Pakistan from the eastern rivers in accordance with the schedule set out in an Annexure to the Treaty. After Transition Period, Pakistan shall have no claim or right to releases by India of any waters of the eastern rivers. In case there are any releases, Pakistan shall enjoy the unrestricted use of waters so released after they have finally crossed into Pakistan. Provided that in the event that Pakistan makes any use of these waters, Pakistan shall not acquire any right whatsoever, by prescription or otherwise, to a continuance of such releases or such uses.

Transition Period

Articles II (5) to (9) lay down that there shall be a Transition Period during which India shall :

(i) limit its withdrawals for agricultural use,

(ii) limit abstractions for storages, and

(iii) make deliveries to Pakistan from the eastern rivers.

The Transition Period shall begin on 1st April, 1960. and it shall end on 31st March, 1970. But it may be ex-

tended by a further one, two or three years at the request of Pakistan.

The Transition Period shall be divided into two parts : Phase I and Phase II.

Phase I shall begin on 1st April, 1960, and it shall end on 31st March, 1965, or if the proposed Trimmu-Islam Link is not ready to operate by 31st March, 1965, but it is ready to operate prior to 31st March, 1966, then on the date on which the Link is ready to operate. In any event, whether or not the Trimmu-Islam Link is ready to operate, Phase I shall end not later than 31st March, 1966.

Phase II shall begin on 1st April, 1965, or, if Phase I has been extended under the provisions of Paragraph 3, then on the day following the end of Phase I but in any case not later than 1st April, 1966. Phase II shall end on the same date as the Transition Period.

Extension of the Transition Period. In the event that Pakistan is of the opinion that the replacement from the western rivers and other sources of water supplies for irrigation canals in Pakistan which, on 15th August 1947, were dependent on water supplies from the eastern rivers, cannot be affected unless the Transition Period is extended beyond March 31, 1970, this period shall be extended at the request (formal notice in writing) of Pakistan.

(*a*) by one, two or three years beyond March 31, 1970 ; or

(*b*) having been extended initially by one year beyond March 31, 1970, then by one or two years beyond March 31, 1971 ; or

(*c*) having been extended initially by two years beyond March 31, 1970, or having been extended by one year beyond March 31, 1971 under (*b*) above, then by one more year beyond March 31, 1972.

The Transition Period shall end not later than March 31, 1973.

If, at the request of Pakistan, the Transition Period is extended as laid down above, World Bank shall thereupon

pay to India out of the Indus Basin Development Fund the appropriate amount specified in the table below :—

Period of aggregate extension of Transition Period	*Payment to India*
One year	£ Sterling 3,125,000
Two years	£ Sterling 6,406,250
Three years	£ Sterling 9,850,000

Replacement Works

The Settlement Plan for Pakistan includes two storage dams, seven link canals, five barrages and a system of tubewells and drainages.

The general scheme of works was drawn up by an Indus Basin Advisory Board set up by the Government of Pakistan, which, in addition to Pakistan Irrigation Engineers, included representatives of American and British engineering firms and in consultation with the World Bank. The responsibility for carrying out the works rests with the Water and Power Development Authority of West Pakistan (WAPDA).

Dams :—

(i) *Mangla Dam.* The first dam is the Mangla Dam. It will be on the Jhelum River near the village Mangla approximately twenty miles from Mangla Headworks.

The initial purpose of the dam is irrigation of 3,000,000 acres and hydel-power generation of 3 lakh KW.

The maximum height of the dam will be 370 feet from river level bed. Its length will be 11,000 feet (about two miles) at its crest. In addition to the main dam, there will be four smaller dams varying in height from 30 to 245 feet. They will be constructed to close the gaps along the southern rim of the reservoir. The four smaller dams will collectively be approximately five miles long. Total cost of the dam is estimated to be Rs. 1,420 million. It will be completed by 1967.

One of the biggest problems of the reservoir was that it would submerge some 68,000 acres of land and would dislocate a population of 85,000 people living in 145 villages. Mirpur was the largest town affected by the dam. Plans were, however, made to resettle the affected population.

On completion, the Mangla Dam will be one of the largest earthfill dams in the world with a total fill of over 80 million cubic yards. The dam will create 36 miles long reservoir. It will have storage capacity of 7.75 million acre feet.

Besides storage of water, the dam will have a hydel-power plant with the initial capacity of 340,000 kilowatts, that is to say, more than double the capacity of the Warsak power-house.

There are plans to raise the height of the dam by another 50 feet in the future. It will raise the storage capacity to 8.3 million acre feet and the ultimate power plant capacity will increase to one million kilowatts.

(ii) *Tarbela Dam.* It is located on the Indus River, thirty miles upstream from Attock. This location is near the village Tarbela, about 15 miles from Haripur.

The purpose of the dam is hydel-power generation up to 6 lakh KW., and annual additional water supply of 4,210,000 acre feet. The estimeted cost is Rs. 1,000 million without power station cost. It is to complete by 1968.

The Tarbela is a rockfill dam with a maximum height of 340 feet, and 10,000 feet (nearly 2 miles) total length at its crest.

On completion, Tarbela will be one of the largest rock-fill dams in the world, having a total fill of nearly 100 million cubic yards. The reservoir will be 25 miles long and will have a storage capacity of 4.2 million acre feet initially and 5.1 million acre feet ultimately. The dam will submerge 34,000 acres of land and will dislocate 40,000 people living in 66 villages.

The Tarbela Dam has a large potential for hydro-electric power. The plan of the dam, in the first instance,

had provision to construct the power plant. The WAPDA has prepared plans to provide for raising the height of the dam by another 110 feet in the future to increase the total storage capacity to 8 million acre feet with power plant having capacity of 1.1 million kilowatts.

Link canals. The plan provides for the construction of seven major new link canals and barrages in the Indus Basin at an estimated cost of Rs. 1,630 million with a stipulation to be completed by 1970. Total length of all new link canals is almost 400 miles. The purpose of the canals and barrages is to bring water from three western rivers, *viz.*, the Indus, the Jhelum and the Chenab, to the canal system based on the three eastern rivers, *viz.*, the Sutlej, the Beas and the Ravi, of the Indus Basin. Total area to be thus irrigated is about 5,000,000 acres. The seven new link canals are :—

(*i*) Rasul-Qadirabad (R.Q.) Link; (*ii*) Qadirabad-Balloki (Q.B.) Link; (*iii*) Balloki-Sulemanki (B.S.) Link No. II; (*iv*) Trimmu-Sidhnai (T.S.) Link; (*v*) Sidhnai-Mailsi (S.M.) Link; (*vi*) Chasma-Jhelum (C.J.) Link, and (*vii*) Taunsa-Panjnad (T.P.) Link.

These link canals will be in addition to the three existing canal links, *viz.*, (*a*) the Marala-Ravi Link, (*b*) the B.R.B.D. Link, and (*c*) the Balloki-Sulemanki Link. They were constructed by the West Pakistan Government. But they were badly damaged due to floods and other causes. A sum of Rs. 130 million has been provided in the plan to re-model them.

1. *The Marala-Ravi Link* (M.R. Link) carries Jhelum River water from Marala to the Ravi River. It has already been constructed by the West Pakistan Government.

2. *The Bambanwala-Ravi-Bedian-Dipalpur Link* (B.R. B.D. Link) carries water from the Ravi River to feed the canals which received water from India.

3. *Balloki-Sulemanki Link No.* 1 (B. S. Link No. 1) carries the Ravi River water from Balloki Headworks to Sulemanki Headworks to feed the Pakpattan Canal and

Bahawalpur area canal taking off from Sulemanki Headworks. It has already been constructed by the West Pakistan Government.

4. *The Rasul-Qadirabad Link* (R.Q. Link) is 30 miles long with a capacity of 19,000 cusecs. It will carry Jhelum water to the Chenab River.

5. *The Qadirabad-Balloki Link* (Q.B. Link) is 104 miles long with a capacity of 18,600 cusecs. It will carry the Jhelum and the Chenab waters to the River Ravi above Balloki Headworks.

6. *The Balloki-Sulemanki Link No. II.* (B. S. Link No. II) with a capacity of 6,500 cusecs runs parallel to the existing Balloki-Sulemanki Link.

7. *The Trimmu-Sidhnai Link* (T. S. Link) is 44 miles long with a capacity of 11,000 cusecs and carries the Indus, Jhelum and Chenab waters to the Ravi River.

8. *The Sidhnai-Mailsi-Bahawal Link* (S. M. Link) is 60 miles long with a capacity of 10,000 cusecs. This link will carry the Indus, Jhelum and Chenab waters to the Islam Canals.

9. *The Chasma-Jhelum Link* (C. J. Link) is 63 miles long with a capacity of 21,700 cusecs. This link will transfer water from the Indus River to the Jhelum River to feed the canals at Trimmu Headworks.

10. *The Taunsa-Panjnad Link* (T. P. Link) is 38 miles long with a capacity of 12,000 cusecs. It will transfer water from the Indus River for use at the Panjnad Headworks.

Barrages. The Settlement Plan provides for the construction of 5 new barrages: (1) at Chasma, on the Indus River, (2) at Rasul, on the Jhelum River, (3) near Qadirabad, on the Chenab River, (4) on the Ravi River above the existing Sidhnai Headworks, and (5) on the Sutlej River, near Mailsi below the existing Islam Headworks.

These five barrages have a total length of nearly 3½ miles. They will have waterways designed to pass maximum floods, aggregating to nearly 4 million cusecs.

Tubewells. The Settlement Plan also includes a system of 2,500 tubewells and drainages to take care of some of the new drainge problems that will be created by the link canals. The tubewells and drainages are designed to overcome waterlogging and salinity in irrigated areas, totalling 2,500,000 acres.

Two phases of work. The replacement works will be completed in two phases. In the first phase, headworks on the Jhelum and Chenab Rivers will be completed in six years and construction of the two dams will begin. In the second phase, construction of the link canals and the remaining works will be undertaken. These will be completed in five to eight years. Digging of the tubewells which forms part of the project, is already in progress.

A tremendous programme. The Settlement Programme is a tremendous undertaking. It will be the largest single water development programme undertaken anywhere in the world at any one time. The total cost of the programme will be approximately the equivalent of 1,070,000,000 dollars (or 380,000,000 pound sterling) of which approximately 870,000,000 dollars (or 310,00,000 pounds sterling) will be spent on works in Pakistan, and approximately 200,000,000 dollars (or 70,000,000 pounds sterling) on works in India. It calls for the excavation of about 700,000,000 cubic yards of earth, for instance, and will require the use of 2,000,000 tons of cement, 250,000 tons of steel and 1,000,000,000 bricks and tiles.

The magnitude of the entire work and the speed at which it has to be completed will create many new problems. Pakistan resources of labour, material and other services will be severely strained. Her own development programme will be handicapped seriously. The Water and Power Development Authority (WAPDA) has been assigned the programme with the time limits specified in the Indus Basin Waters Treaty.

Works in India. The Indus Settlement also envisages the construction of large earthfill dam on the Beas River in India. The dam will create a reservoir with a live

capacity of 5.5 million acre feet, and a hydro-electric potential for generating 200,000 kilowatts of power. Together with the Bhakra Reservoir on the Sutlej River and with the newly constructed Rajasthan canal system, it will serve as the basis for irrigating large areas in the Punjab and in the Rajasthan desert. The Beas Project will not be financed from the Indus Basin Development Fund. The foreign exchange cost will be met by a loan of 33 million dollars from the United States Government and by a loan of 23 million dollars from the World Bank. The rupee expenditure will be borne by the Government of India.

Development Fund and Loans

To finance the cost of replacement works three agreements, besides the Indus Basin Waters Treaty, closely connected with it, were executed simultaneously. The Indus Basin Development Fund was established by the Indus Basin Development Fund Agreement. It provides the Fund with the following resources of foreign exchange. An agreement was executed with the World Bank for a loan of 90 million dollars. Yet another loan agreement was executed by Pakistan for a sum of 70 million dollars from the U.S. Development Loan Fund. The details are given below.

The Indus Basin Development Fund Agreement which creates a total fund of 900 million dollars to finance the construction of irrigation and other works consequential to the Treaty Agreement. Out of the total fund, about 640 million dollars will be contributed by the participating Governments, 174 million dollars by India and 80 million dollars will come out of the proceeds of World Bank Loan to Pakistan.

The Development Fund will be administered by the World Bank. As Administrator, the Bank will be responsible under the Fund Agreement for calling up half-yearly contributions to the Fund and for regulating disbursements from the Fund to meet approved expenditures incurred by WAPDA on the works in Pakistan as the construction programme progresses.

Source	*Currency*	*Figure*
A—Treaty contribution by India	Pound Sterling	62,060,000
B—Contribution in grants from each of the following Governments in the amounts shown :		
Australia	Australian Pound	6,965,000
Canada	Canadian Dollars	22,100,000
Germany	D. Marks	126,000,000
New Zealand	New Zealand Pound	1,000,000
United Kingdom	Pound Sterling	20,860,000
United States	Dollars	177,000,000
C—Proceeds of a United States Government loan to Pakistan	Dollars	70,000,000
D—Proceeds of a World Bank loan to Pakistan	Dollars	80,000,000
E—Contribution by Pakistan	Pound Sterling	440,000
All the above contributions will be freely usable or convertible for purchase in member countries of the International Bank for Reconstruction and Development (World Bank) and in New Zealand and Switzerland		
F—Contribution by the United States in Pakistan rupees equivalent	Dollars	235,000,000
This contribution will be in the form of grants or loan or both to Pakistan as may be agreed between the United States and Pakistan		
G—Contribution by Pakistan (Pak. rupees equivalent)	Pound Sterling	8,950,000

World Bank loan. An agreement covering the 90 million dollars World Bank loan to Pakistan was also signed. Eighty million dollars of this will be paid into the Indus Development Fund and the balance of 10 million dollars will be available to meet the interest and other charges on loan during the first eight years of the period of construction of the work.

The loan is to be repaid over a period of 20 years beginning in 1970. Each portion of the loan, as it is made available, will carry interest at the rate then in effect for the long-term loans being made by the Bank.

Loan from United States DLF. The third agreement for a loan of 70 million dollars to Pakistan from the U.S. Development Loan Fund was signed. Repayment of this loan to the United States will be made in Pakistan currency over a period of 30 years from the date of the first disbursement and the interest will be at the rate of 3½ per cent per annum.

Permanent Indus Commission

The Treaty sets up a permanent Indus Commission composed of two persons, one appointed by each of the Governments, *viz.*, of India and Pakistan. The Commission will have general responsibility for implementing the provisions of the Treaty and will seek to reconcile any points of disagreement that may arise. Once every five years, the Commission will make a general tour of all the works on the rivers, and the Commission may, on the request of either Commissioner at any time, visit any particular work in either country.

The Commission will report at least once a year to each of the Governments. Each Government undertakes to give to the Commissioner of the other Government the immunities and privileges extended under the Convention on Privileges and Immunities of the United Nations.

Where differences or disputes cannot be resolved by agreement between the Commissioners, the Treaty establishes machinery for resort to a "neutral expert" (who is to be a highly-qualified engineer) for a final decision on

technical questions, and for resort, in certain circumstances, to a court of arbitration.

Annexures

The Treaty has nine annexures. The principal matters covered in these annexures are: agricultural use by Pakistan of water from the tributaries of the River Ravi agricultural use by India of water from the western rivers; generation of hydro-electric power by India on the western rivers; storage of water by India on the western rivers; questions that may be referred to a neutral expert; appointment and procedure of a court of arbitration; and transitional arrangements relating to the deliveries of water to Pakistan from the eastern rivers during the Transition Period.

Advantages and Disadvantages

Advantages. The Treaty secures complete independence for Pakistan in the sphere of irrigational requirements. For a more rational utilisation of the waters on the Indus, the Jhelum and the Chenab, the inter-linking of the rivers provided in the Treaty would have been desirable by itself.

A part of the two storages at Mangla and Tarbela will be available for development purposes over and above the existing uses. They will also give additional supplies badly needed for reclamation of saline areas. Moreover, construction of the two dams will help much in controlling floods which cause widespread damage so often.

The Sutlej Valley Canals in Pakistan taking off from the Sulemanki Headworks will receive somewhat increased supplies during the first phase of the Transitional Period. In the second phase, these canals will get much more supplies as compared with the previous supplies.

Electric power of the order of about 3 lakh KW will be generated from the Mangla Dam and 6 lakh KW from the Tarbela Dam.

The Settlement Plan. A sum of 50 million dollars has been provided for drainages and tubewells. It will

augment the water supplies and facilitate the much-needed reclamation of waterlogged areas in West Pakistan.

Disadvantages. Pakistan which used to get water supplies from all the Indus Basin rivers will now have to be content with the waters of only three rivers, *viz.*, the Indus, the Jhelum and the Chenab, the other three rivers, *viz.*, the Sutlej, the Beas and the Ravi going exclusively to India.

In order to feed areas of West Pakistan, dependent on the eastern rivers, water will have to be brought over long distance from the western rivers. It will involve considerable transit losses.

The link canals will expose the areas, they will pass through, to the risk of water-logging. In order to avoid it the link canals will have to be lined either in their entirety or partly, and drainage channels will have to be dug. Moreover, the canals will be subject to the hazards of floods. Diversion of rivers on a large scale will reduce the quantity of water which normally becomes available on regeneration.

There is no provision in the Settlement Plan for replacement of the loss of "*sailab*" cultivation. As such, large areas, which depend on this source of irrigation, will become a burden on Pakistan's economy.

Storages begin to die out from the day they are completed. Sedimentation will put a limit on their life.

The replacement works involve engineering works of unprecedented magnitude and complexity. Their execution will strain very seriously Pakistan's technical personnel and material resources.

In broad outline, the replacement works consist of two large dams—one at Mangla on the River Jhelum with a capacity of 4.75 million acre feet, and the other at Tarbela on the Indus with a capacity of 4.21 million acre feet—five barrages—at Chasma on the Indus, at Rasul on the Jhelum, at Qadirabad on the Chenab, at Sidhnai on the Ravi, and at Mailsi on the Sutlej to facilitate interlinking of the rivers—seven new link canals, and drainage channels and tubewells.

2

NORTH ATLANTIC TREATY ORGANISATION (NATO)

The North Atlantic Treaty—a joint defence system—was signed in Washington on April 4, 1949 by the U.S.A., Britain, Canada, France, Holland, Belgium, Luxembourg, Italy, Denmark, Norway, Iceland and Portugal. Later on, Turkey and Greece acceeded to the Treaty raising the number of member countries to fourteen. In December, 1954, West Germany entered the alliance.

The Treaty. It consists of 14 articles. The most important of these articles were Article 6 defining the area to be covered by the Treaty ; Article 5, the "trigger" clause setting forth the obligations of member states if an armed attack should occur within the defined area ; and Article 2, providing the basis of political and economic co-operation within the alliance. On entering Turkey and Greece into the Treaty the modified Article 6 explicitly included "the territory of any of the Parties in Europe or North America...the Algerian Departments of France...the territory of Turkey or...the islands under the jurisdiction of any of the Parties in the North Atlantic area north of the Tropic of Cancer." The Parties agreed under Article 5 that an armed attack against one or more of them should be considered an attack against them all. Article 2 provided that the Parties would contribute towards the further development of peaceful and friendly international relations by strengthening their free institutions, by bringing about a better understanding of the principles upon which these institutions are founded, and by promoting conditions of stability and well-being.

The Parties to this Treaty re-affirm their faith in the purposes and principles of the Charter of the United Nations and their desire to live in peace with all people and all Governments.

They are determined to safeguard the freedom, common heritage and civilization of their peoples formed on the principles of democracy, individual liberty and the rule of law. They seek to promote stability and well-being in the North Atlantic area. They are resolved to unite their efforts for collective defence for the preservation of peace and security. They, therefore, agree to this North Atlantic Treaty.

Article 1. The Parties undertake, as set forth in the Charter of the United Nations, to settle any international disputes in which they may be involved by peaceful means in such a manner that international peace and security, and justice, are not endangered, and to refrain in their international relations from the threat or use of forces in any manner inconsistent with the purposes of the United Nations.

Article 2. The Parties will contribute toward the further development of peaceful and friendly international relations by strengthening their free institutions, by bringing about a better understanding of the principles upon which these institutions are founded and by promoting conditions of stability and well-being. They will seek to eliminate conflict in their international economic policies and will encourage economic collaboration between any or all of them.

Article 3. In order more effectively to achieve the objectives of this Treaty, the Parties separately and jointly, by means of continuous and effective self-help and mutual aid, will maintain and develop their individual and collective capacity to resist armed attack.

Article 4. The Parties will consult together whenever in the opinion of any of them the territorial integrity, political independence or security of any of the Parties is threatened.

Article 5. The Parties agree that an armed attack against one or more of them in Europe or North America shall be considered an attack against them all ; and conse-

quently they agree that, if such an armed attack occurs, each of them, in exercise of the right of individual or collective self-defence recognized by Article 51 of the Chartér of the United Nations, will assist the Party or Parties so attacked by taking forthwith, individually and in concert with the other Parties, such action as it deems necessary, including the use of armed force, to restore and maintain the security of the North Atlantic area.

Any such armed attack and all measures taken as a result thereof shall be deemed reported to the Security Council. Such measures shall be terminated when the Security Council has taken the measures necessary to restore and maintain international peace and security.

ARTICLE 6. For the purpose of Article 5 an armed attack on one or more of the Parties is deemed to include an armed attack on the territory of any of the Parties in Europe or North America, on the Algerian Departments of France, on the occupation forces of any Party in Europe, on the islands under the jurisdiction of any Party in the North Atlantic area north of the Tropic of Cancer or on the vessels or aircraft in this area of any of the Parties.

ARTICLE 7. This Treaty does not affect and shall not be interpreted as affecting in any way the rights and obligations under the Charter of the Parties which are members of the United Nations or the primary responsibility of the Security Council for the maintenance of international peace and security.

ARTICLE 8. Each Party declares that none of the international engagements now in force between it and any other of the Parties or any third State is in conflict with the provisions of this Treaty and undertakes not to enter into any international engagement in conflict with this Treaty.

ARTICLE 9. The Parties hereby establish a Council, on which each of them shall be represented, to consider matters concerning the implementation of this Treaty.

The Council shall be so organized as to be able to meet promptly at any time. The Council shall set up subsidiary bodies as may be necessary; in particular it shall establish immediately a Defence Committee which shall recommend measures for the implementation of Articles 3 and 5.

ARTICLE 10. The Parties may, by unanimous agreement, invite any other European State in a position to further the principles of the Treaty and to contribute to the security of the North Atlantic area to accede to this Treaty.

Any State so united may become a Party to the Treaty by depositing its instruments of accession with the Government of the United States of America, which will inform each of the Parties of the deposit of each such instrument of accession.

ARTICLE 11. This Treaty shall be ratified and its provisions carried out by the Parties in accordance with their respective constitutional processes.

The instruments of ratification shall be deposited as soon as possible with the Government of the United States of America, which will notify all the other signatories of each deposit. This Treaty shall enter into force between the United States which have ratified it as soon as the ratifications of the majority of the signatories including the ratifications of Belgium, Canada, France, Luxembourg, the Netherlands, the United Kingdom and the United States have been deposited, and shall come into effect with respect to their States on the date of deposit of their ratifications.

ARTICLE 12. After the Treaty has been in force for ten years, or at any time thereafter, the Parties shall, if any of them so requests, consult together for the purpose of reviewing the Treaty, having regard for the factors then affecting peace and security in the North Atlantic area, including the development of universal as well as regional arrangements under the Charter of the United Nations for the maintenance of international peace and security.

ARTICLE 13. After the Treaty has been in force for twenty years, any Party may cease to be a party one year after its notice of denunciation has been given to the United States of America which will inform the Governments of other Parties of the deposit of each notice of denunciation.

ARTICLE 14. This Treaty, of which the English and French texts are equally authentic, shall be deposited in the archives of the Government of the United States of America. Duly certified copies thereof will be transmitted by the Government to the Governments of each of the other signatories.

Background. The Treaty was a sort of European and American coalition against the Soviet Union. Soviet action inside the United Nations had forced the West to the conclusion that the international organization could not in and of itself maintain peace and security. The haste with which the Soviet Union converted eastern European countries from German satellites into Communist puppets indicated that Russia was bent on external expansion. Above all, the Communist *coup d'etat* in Czechoslovakia in 1948 and the break-down of the four-power Control Commission in Germany posed for Western statesmen a threat to their national security and independence. The Western Powers took three types of action. First was the elimination of Communists from the ministries of certain European countries and the isolation, if not the reduction to impotence, of the various national Communist parties which were pro-Russian. In 1947, this step was taken by France and Italy where Communist parties were very large. The second requisite was co-operation among European nations, since individually each was quite incapable of defending itself against the Communist colossus. A beginning in this direction was made in 1948 as the European co-ordinating agency for the European Recovery Programme (ERP), of the Organization for European Economic Co-operation (OEEC). More significant as the fore-runner of the North Atlantic Treaty was the Brussels Pact, a 50-year mutual defence alliance, signed in March, 1948 by Belgium, the Netherlands, France

and the United Kingdom just one month after the Communists seized control of Czechoslovakia. In the third place the West European countries could stand against Soviet Russia if North America was made to throw its might into the balance. Under the Marshall (ERP) Plan the United States in 1948 had undertaken a multibillion dollar programme of economic assistance. For an effective check against Soviet Russia, military aid and political commitments were also needed.

Aims and objects. The NATO was brought into being by the 'free nations' of the West in an effort to prepare their joint defence in response to an overwhelming Soviet strength and to the menace which Soviet policy and action represented.

The member-countries affirmed their faith in the purposes and principles of the U.N. Charter. They intended to protect the freedom and civilization of their peoples. They sought to promote the stability and security of the North Atlantic area by pooling their efforts for collective defence and peace.

The NATO has a clause that armed aggression against any one of its members would be an aggression against all.

Under NATO Treaty the U.S. President is empowered to straightaway order the movement of troops to help the member-countries in case of aggression without going through the constitutional processes and making formal declaration of war.

Structure. The main features of the present structure of NATO, as agreed upon in May 1951, are as follows :—

1. North Atlantic Council consisting of Foreign Ministers and Defence Ministers of all the Powers is responsible for the implementation of the Treaty. It meets annually.

2. North Atlantic Council of Deputies is the permanent working organisation of the Council.

3. The economic and financial structure consists of a Defence Production Board, the Financial and Economic Board and the Planning Board for Ocean Shipping.

4. There is a Military Committee composed of the representatives of the Chiefs of Staff. It provides guidance of the standing troops consisting of France, U.K. and U.S.A. It is responsible for higher strategic directions throughout the area. The Supreme Allied Commander in Europe was Gen. Norstad. He succeeded Gen. Eisenhower.

The Council and Committees of the NATO have been meeting to discuss various problems, such as "Three-Year Military Plan," "NATO's Master Plan," etc.

S.H.A.P.E. (Supreme Headquarters of the Atlantic Powers in Europe) was formed in January, 1951. It is a sort of Military Committee formed of the Chiefs of Staff of the Allied countries. The S.H.A.P.E., with the command headquarters at Rocquencourt, near Paris, commands the common defence forces of the member-countries. The three regional sub-divisions, namely, Southern Europe, Central Europe and Northern Europe are each under the control of a Commander-in-Chief, Allied Forces. There is the Supreme Allied Commander in charge of the whole set-up.

Turkey and Greece joined NATO. To guard against Russia, the eastern approaches to the Mediterranean including the strategically important warm-water route from the Black Sea to the Mediterranean, Turkey and Greece were admitted to the NATO in January, 1952. It is notable that Turkey flanks the land route from Russia to the rich oilfields of the Middle East. By allowing Turkey and Greece enter the NATO, effective barriers were placed to Soviet expansion in the Eastern Mediterranean and Middle East areas. Describing the North Atlantic Treaty as "aggressive" Russia warned Turkey that Russia could not remain indifferent to Turkey's joining the "aggressive Atlantic Bloc" and Atlantic Pact, and allow the Turkish territory to be used for the establishment of foreign military

bases on the Soviet frontiers. Turkey informed Russia that she joined the Atlantic Pact only to ensure her own national security against aggression within the framework of collective security.

Soviet proposal to join NATO. Russia, in a Note handed to the British, French and American Ambassadors in Moscow on March 31, 1954, offered to join NATO. The Note said it was perfectly evident that the North Atlantic Treaty Organisation might lose its aggressive character in the event of all the Great Powers, which participated in the anti-Hitler coalition, taking part in it. The Russian Note reiterated that she believed an agreement must be reached to rule out the employment of atomic energy for the wholesale annihilation of human beings.

On the all-Europe alliance it commented : "Such co-operation between all the European States, both big and small, independent of their social order, would permit the avoidance of a situation in which Europe is periodically drawn into disastrous wars." The Note further said that it must not be overlooked that both the World Wars I and II were preceded by the establishment of opposite military groups of countries and the splitting of Europe into two hostile camps. "Nor must we forget the particularly dangerous role of German militarism in such military groups and in provoking the World Wars I and II. Reviving German military and forming military group in Europe, far from promoting peace, means paving the way for another war."

Reactions. The move was interpreted as another attempt to block progress on the European Defence Treaty. It was feared lest the proposal should destory the chances of French ratification within the foreseeable future. According to a view, the Note was considered another attempt to weaken NATO and cause dissensions among the Western Allies. It was also felt in the USA that the West's Defence Programme was "getting on Russia's nerves."

Soviet offer rejected. America rejected the Soviet offer because the proposal inspired no confidence in the face of the continued iron grip of the Soviet Union on its captive peoples. The USA realised that "the offer was a manoeuvre to gain admission within the walls of the West to undermine the security."

Mr. Anthony Eden, the then Foreign Secretary, opposed the idea of Russia becoming a member of the Atlantic Pact. He said that "Soviet membership of NATO would not of itself be a sufficient assurance to the members of that Organisation who will understand that its continued existence is their surest guarantee of a free life."

Atomic weapons and German forces for NATO. The 14-nation Atlantic Council, at its December 1955 meeting held in Paris, decided to authorise its Military Commander to plan for defence while leaving the authority of such atomic weapons in the hands of the member-Governments. Some American units were said to have been equipped with the atomic artillery and rockets. The Nine-Power Conference held at London decided to admit West Germany to NATO. She was to contribute 12 Divisions (*i.e.*, 500,000 army.)

New programme for NATO. It was announced in Paris on March 26, 1957, that the 15-nation North Atlantic Council had agreed on a new £ 225 million infra structure programme to be undertaken during the next four years. The new programme will provide funds for building additional airfields, fuel pipeline systems, storage facilities as well as the completion of NATO's air and naval bases programmes.

NATO countries' new defence policy. The first NATO Ministers' Conference at Bonn ended on May 3, 1957. The two-day meeting was held to review the strength of e North Atlantic Alliance in the face of the latest Soviet politics. On May 2, 1957, the Foreign Ministers of the 15-North Altantic Treaty nations agreed that the Western Allies must base their defence against a potential Communist attack on "a balance between conventional and nuclear weapons." The Council said that pending the

conclusion of an acceptable disarmanent agreement no power could claim to prohibit NATO from possessing "the modern arms necessary to its defence."

Lord Ismay, former Secretary-General of the NATO, said that NATO had the following outstanding achievements to its credit :—

1. It had achieved its basic aim to maintain peace.

2. All member-Governments had learned to develop their political co-operation without let-up.

3. It had set up a defensive shield which, although not as solid as might be hoped, was nevertheless a prime factor in discouraging aggression.

4. Member-nations had developed mutually a remarkable unity at all levels in all fields.

He said the best way to preserve peace was to make these points clear to any aggressor :—

(i) The Atlantic Alliance was strictly defensive and would never attack anybody.

(ii) If a NATO Pact partner were attacked, all other members would spring to arms in defence of their territory, freedom and way of life and they would all fight "in loyal comradeship to the last ounce of their strength."

NATO has vast destructive power. On June 9, 1957, speaking at the commencement of exercises at Olaf College, Northfield, Minnesota, General Lauris Norstad, Supreme Allied Commander in Europe, stated that NATO's vast destructive power, including a variety of atomic armaments had been and would remain a most important element in world strategy. He added: "The Soviet Union's threat remains, but opposing it now are not 15 different nations, each threatened with separate and consecutive engulfment, but one NATO community far too massive even for the voracious Soviets to attempt." "For what deters the Russians now is their knowledge that, no

matter what damage they might inflict upon our alliance, the alliance is already able to retaliate in such a crushing measure."

Bonn troops under NATO. It was reported on June 30, 1957, that West German land troops would officially come under NATO command on July 1, 1957, with one motorised Infantry Division going into the Northern Army under a British General, Sir Dudley Weed. Two other Divisions were to come under the American-commanded Southern army group. At full strength, the three Divisions would contain 12,000 to 13,000 men each.

NATO "Illegitimate child of Communism." On February 21, 1959, the Secretary-General of the North Atlantic Treaty Organisation (NATO) said the Soviet Union had only itself to blame for the creation of NATO. He said the Atlantic Alliance is "more an illegitimate child of Communism than the fruit of our own determination."

NATO military accord. On October 25, 1957, the Secretary-General of the NATO strongly appealed for co-ordination of the "free" world and NATO efforts in the military, political, scientific and economic fields in order to 'meet the challenge thrown out by the then Soviet Communist Party chief, Nikita Khrushchev" that the Soviet was in possession of an inter-continental ballistic missile. He called upon the U. S. to share its atomic secrets with friendly nations. He said that NATO should work out "a co-ordinated, if not a common foreign policy, on the part of member-countries." He further said : "Great majority of people in Western Europe favoured the maintenance of American troops in Europe."

Defence scheme. The NATO Parliamentary Conference, held on November 15, 1957, approved a resolution of its Military Committee for strengthening and perfecting of the Atlantic defence system in the face of the Soviet threat. The resolution also urged common policy to serve as the basis for a common defence system against the danger of aggression. The strengthening of the defence

system included the equipment of ground forces with tactical atomic weapons, appropriate air and naval forces and an effective civil defence.

NATO rejected Berlin Plan. On December 19, 1958 the NATO Council, at its Paris meeting, rejected the Soviet proposal aimed at making West Berlin a demilitarised, free city. The Council said that the Soviet Union could not change the city's status unilaterally. It declared its readiness to discuss the whole German question with Russia.

On February 13, 1959 the Permanent Council of the NATO approved the draft of Western reply to Russia on the question of Berlin and Germany. The draft proposed Four-Power Foreign Ministers Conference to Russia to discuss the German problem, as a whole.

When asked whether West Berlin formed part of the NATO defence area, it was stated : "There are the U.S., French and British troops in West Berlin, and if there is any aggression the NATO Treaty will come in."

NATO lands to have N-weapons. The Supreme Allied Commander of the NATO forces deelared at a press conference at Paris on February 17, 1959 that plans were completed at the S.H.A.P.E. so that requirements for atomic warheads can be met throughout the NATO. He added plans for atomic stocks in the NATO countries were being completed and that atomic projectiles would be availabte to all countries of the Alliance.

On October 31, 1960, West German Chancellor, Konrad Adenauer called for equipping NATO with atomic arms. Equipping NATO with an atomic deterrent that would fit NATO's needs was justified, he maintained, by defence requirements created by Communist bloc atomic capacities. If NATO were provided with its own nuclear deterrent force, disarmament would not be made more difficult.

The future of NATO. A general view of the first eleven years of the NATO Alliance would show that in spite of the binding nature of the original contacts and in spite of initial model of harmony among the partners in the

Alliance, there are persistent signs of growing differences. No doubt some attempts have been made to keep up appearances and "the quarrels were conducted with greater discretion behind closed doors, and in public the appropriate smiles and handshakes were duly rehearsed for our edification, but with each passing year it has become progressively more difficult to present a smiling facade. The discordances have become louder and shriller. Most of the time, at its top-level meeting, is taken up by attempts to patch up internal conflicts and there is less and less attention given to the purposes which were originally trumpeted as the *raison d'etre* of the whole costly venture.

NATO failed in first test. In Dec. 1961 India occupied Goa and other possessions of Portugal in India by force. Although Portugal was a member of the NATO, yet no member helped Portugal against the aggression.

Question of collective or individual nuclear force for NATO. At first, Britain and the United States were the only nuclear Powers in the NATO. The question of the conditions under which the atomic weapons would be used did not arise. The British and the American defence systems were so closely co-ordinated, especially in the field of operations involving the American Strategic Air Command and the British Air Command. Now France has also become a nuclear power. France indicated her determination to have her own nuclear force. The French Government had a two-fold purpose in building up its own national striking force. First, it placed France on the same level as her two allies who possess atomic weapons. Second, it opened new possibilities for Europe in this field.

It should be noted that there are two distinct and different conceptions of a nuclear striking force—the American and the European idea. The American conception of a nuclear striking force would leave it up to the United States to decide on the use of the nuclear weapon. The European idea of a striking force is for links with the United States unclear power, but not solely dependent upon it. The British Press often supported the idea of such a "European" force. The United States of America was in

favour of a collective nuclear force without specifying how NATO could use it. President Kennedy publicly condemned French policy of individual nations having their own nuclear striking force, and also reminded his allies that America was carrying the main defence burden and would have "some voice" on Berlin.

"We do not believe in a series of national deterrents," he said. "We believe that a NATO deterrent...can provide adequate protection." It would be dangerous if nation after nation followed France in wanting to express its independence by building up its own nuclear deterrent.

Stressing that the U. S. was the leader of the Western Alliance and was carrying the main defence burden, President Kennedy said in a reference to Berlin : "We shall have some voice in events there because, if the moment of truth arrives, it is the U.S. which will be expected to take very vigorous action which could involve our security as well as the security of the Western Europe.

Problems of co-ordination. Not without difficulty were arrangements for defence set in place. While recognizing the necessity for co-operation, nations were understandably reluctant to accept subordinate positions in areas which for centuries they had individually fought to defend—often against their contemporary partners. Where overlapping interests threatened to conflict, as in the Mediterranean, organizational arrangements perforce reflected compromises hammered out in lengthy sessions. Furthermore, it was easier to advocate national concentrations on particular weapons and particular forces than it was in practice to induce nations to abandon portions of their military establishments. Equality of sacrifice was another principle accepted in theory by all, but practically impossible to write into any acceptable mathematical formula for the sharing of defence costs.

No NATO accord on problems. The United States and its Atlantic Pact allies were reported to have wound up their three-day Paris meeting on December 15, 1962 with a surface show of unanimity but little achieved to settle their differences.

3

THE CENTRAL TREATY ORGANISATION (CENTO)

(Formerly *Baghdad Pact*)

Today, the Muslims of the Middle East stand divided into two camps—the Arab League headed by Egypt, Syria, etc., and the Baghdad Pact, now CENTO, consisting of Britain, Turkey, Pakistan and Iran. Why ?

On the night of February 24, 1955, Turkey and Iraq signed, in Iraq, a defence pact known as Turco-Iraq Pact, or Baghdad Pact.

Terms. The Treaty contains eight articles and two interpretative letters. The terms are as follows :

1. Consistent with Article 51 of the United Nations Charter the high contracting parties will co-operate for their security and defence. Such measures as they agree to take to give effect to this co-operation may form the subject of special agreements with each other.

2. In order to ensure the realisation and effective application of the co-operation provided for in Article 1 above, competent authorities of the high contracting parties will determine the measures to be taken as soon as the present pact enters into force. The measures will become operative as soon as they have been approved by the Governments of the high contracting parties.

3. The high contracting parties undertake to refrain from any interference whatsoever in each other's internal affairs. They will settle any dispute between themselves in a peaceful way, in accordance with the United Nations Charter.

4. The high contracting parties declare that the dispositions of the present pact are not in contradiction with any of the international obligations contracted by either of them with any third State or States. They do not derogate

from and cannot be interpreted as derogating from the said international obligations. The high contracting parties undertake not to enter into any international obligation incompatible with the present pact.

5. This pact shall be open for accession to any member of the Arab League or any other State actively concerned with the security of peace in this region and which is fully recognised by both the high contracting parties.

Accession shall come into force from the date on which the Instrument of Accession of the State concerned is deposited with the Ministry of Foreign Affairs of Iraq.

Any acceding State, party to the present pact, may conclude special agreements, in accordance with Article 1, with one or more States, parties to the present pact.

The competent authority of the acceding State may determine measures in accordance with Article 2. These measures will become operative as soon as they have been approved by the Governments of the parties concerned.

6. A permanent Council at Ministerial level will be set up to function within the framework of the purpose of this pact when at least four Powers become parties to the pact.

The Council will draw up its own rules of procedure.

7. This pact remains in force for a period of 5 years, renewable for another five-year period. Any contracting party may withdraw from the pact notifying the other parties in writing of its desire to do so, six months before the expiration of any of the above-mentioned periods, in which case the pact remains valid for the other parties.

8. This pact shall be ratified by the contracting parties and ratifications shall be exchanged at Ankara as soon as possible. Thereafter, it shall come into force from the date of the exchange of ratification.

In witness whereof, the said Plenipotentiaries have signed the present pact in Arabic, Turkish and English, all

the three texts being equally authentic except in the case of doubt when the English text shall prevail.

Done in duplicate at Baghdad this second day of Rajab 1374 Hijri, corresponding to the 24th February, 1955.

"Signed Nuri-al-Said for His Majesty the King of Iraq; (signed) Adnan Menderes for the President of the Turkish Republic; (signed) Burhanuddin Bashayan for His Majesty the King of Iraq; (signed) Fuad Koprulu for the President of the Turkish Republic."

The first of the interpretative letters, signed by the Iraqi Premier, Nuri-al-Said, notes agreement "on the fact that this pact permits both our countries to co-operate to ensure the maintenance of peace and security in the Middle East. We agree to work in co-operation to make effective all United Nations resolutions concerning Palestine.

The second interpretative letter, signed by the Turkish Premier Adnan Menderes, notes agreement with Nuri-al-Said's letter.

Baghdad Pact set-up. The Baghdad Pact consists of the Council, Military Committee, the Military Deputies Committee, the Military Planning Groups, Experts of Economic Committee, Subcommittees and working parties, the Baghdad Pact Nuclear Centre, the Counter-Subversion Committee, the Liaison Committee, etc.

THE COUNCIL. The Council is the supreme body of the Baghdad Pact Organisation. It was constituted in November, 1955 with a view to providing for "continuous consultation on political and economic questions as well as military matters affecting their cultural interests." The decisions of the Council must be reached unanimously.

The Council meets at the Ministerial level and the Deputies level. In the former case, the member-countries are represented by Prime Ministers, Foreign Ministers, by senior Cabinet Ministers, whereas in the latter case they are represented by the Deputies of Ambassadorial rank. The United States Government is represented at the meetings by an observer. The Chairman of the

Council is appointed annually in alphabetical order in the English language.

Meetings. The Council is in permanent session. The provision for meeting at the Deputies' level is designed to see that its work is continuous. But, normally, the Council meets twice a year at the Ministerial level, at least once in the country holding the Presidentship for the year. Meetings at Deputies' level are held in Baghdad at least once in every week or whenever required.

MAIN COMMITTEES. The Council established four main Committees, *i.e.*, Military Committee, Economic Committee, Counter-Subversion Committee, and Liaison Committee. Some of them have set up various sub-committees and working groups.

THE MILITARY COMMITTEE. It recommends to the Council how to strengthen the Military security of the member-countries and their co-operation in defence matters. The Committee also directs the work of subordinate military bodies set up under the pact. The Chief of Staff of the Commander-in-Chief of each country normally represents on the Military Committee. The United States is represented at the meetings by a senior officer acting as an observer.

THE MILITARY DEPUTIES' COMMITTEE, which is next below the Military Committee, is designed to co-ordinate all military planning within the pact and to make recommendations accordingly to the Military Committee.

THE MILITARY PLANNING GROUPS. The business of the Economic Council is to develop and strengthen the economic and financial resources of the Baghdad Pact area. Ministers or senior officials of member-countries represent on the Economic Committee.

THE ECONOMIC COMMITTEE. The business of the Economic Council is to develop and strengthen the economic and financial resources of the Baghdad Pact area. Ministers or senior officials of member-countries represent on the Economic Committee.

Experts of the Economic Committee. Before the sessions of the economic Committee are held normally; meetings of the economic experts from member-countries are held. The experts review and co-ordinate the reports of the various sub-committees and working parties and prepare the ground for meetings of the Economic Committee.

SUB-COMMITTEES AND WORKING PARTIES. Sub-committees have been established in various fields, *e.g.*, animal disease and husbandry, co-operation in agricultural planning, communications, education and quarantine measures, sound pest control and trade, etc. Temporary working parties have been set up to study specific questions, such as training in the peaceful uses of atomic energy, problems connected with the elaboration of joint economic projects, joint development planning for the Tigris and Euphrates Rivers, veterinary education, joint training in the use of agricultural machinery, etc.

THE BAGHDAD PACT NUCLEAR CENTRE is a nuclear training centre set up in Baghdad. It aims at promoting training in and the study of the technical applications of atomic energy for peaceful purposes.

The Scientific Council. A Scientific Council has been established to supervise the functioning of the Nuclear Centre. Each of the pact countries is represented on the Scientific Council. The Council is the scientific and technical policy-making body of the Centre. The Council meets at least once in every six months.

THE COUNTER-SUBVERSION COMMITTEE. The Committee is charged with making recommendations as to how the threat of subversion to member-countries of the region could be best countered.

THE LIAISON COMMITTEE is designed to facilitate the exchange of information between member-countries on questions relating to the security of the region.

THE SECRETARIAT is composed of nationals of all the countries contributing to the international budget of the Secretariat. The Secretary-General and the Chief Military Secretary are from Iraq, whereas the four Deputy Secre-

taries-General and the Security Advisers are taken from the other four pact countries.

The Secretary-General, the chief executive of the Baghdad Pact Organisation, is responsible to the Council for directing the work of the Secretariat.

Accession to the Pact : Britain. On March 30, 1955, Britain announced to have acceded to the Turco-Iraq Pact. At the same time, Britain proposed to conclude with the Government of Iraq a special agreement for mutual co-operation under Article 1 of the pact together with supplementary exchange of notes.

Anglo-Iraqi Defence Treaty. Britain and Iraq signed their new Defence Treaty of Alliance on April 4, 1955. The agreement replaced Anglo-Iraqi Treaty of 1930, which was to expire in 1957. The new defence arrangements were within the context of Turco-Iraq Pact. Under the agreement, Britain was to evacuate her Royal Air Force from Habbaniya and Shaibah within a year. She held these bases under the 1930 Treaty which came into force two years after Iraq became a member of the League of Nations.

Pakistan. On September 23, 1955, Pakistan formally acceded to the Baghdad Pact bringing the total number of adherents to the pact to four—the other three being Iraq, Turkey and the United Kingdom.

Pakistan's decision to join the Turco-Iraq Mutual Co-operation Pact is in line with the unchanging trends of its foreign policy inspired by the resolve to promote international peace and co-operation with like-minded nations. The pacts of Powers in an armed and divided world make it necessary to less powerful nations to forge alliances based on common aims and objectives.

Iran. On November 3, 1955, Iran joined Baghdad Pact increasing the number of adherents to five. Russia complained in her Note on November 26, that Iran's membership of the Turco-Iraq Defence Treaty had "seriously damaged Soviet-Iran relations." Iran replied that her adherence to the pact in no way represented a

threat to the Soviet Union and that it was not an instrument of aggression. The Treaty was in accordance with the United Nations Charter.

MEDO formed. Britain and four strategic nations along Russia's southern border completed on November 22, 1955, formation of a permanent Middle East Defence Organisation against Russian aggression.

U.S. Joined Baghdad Pact Military Committee. In June 1957 the United States acceded to the Military Committee of the Baghdad Pact. After joining the Military Committee the United States assumed the membership of all the three Committees of the pact, the Economic and Counter-Subversion Committees being the other two which it had joined earlier.

Road-link among Baghdad Pact Muslim Powers. It was disclosed by Pakistan's Finance Minister towards the end of January, 1957, that the project of linking Baghdad Pact Powers by road had been taken up by the Economic Committee of Baghdad Pact and received favourable consideration. That project would channel a good portion of ex-President Eisenhower's proposed 200 million dollars in economic aid for the Middle East into a northern tier highway, linking their countries, *viz.*, Pakistan, Iran, Iraq and Turkey. The road, stretching 300 miles or longer, would provide an alternative route between the Arabian Sea and the Mediterranean, by-passing the Suez Canal. The route would link Karachi, Teheran, Baghdad, Ankara and emerge to Istanbul. The US officials commenting on the highway proposal said it was one of the two plans that had been thought about for some time. The other, a Pan-Arab highway linking all the Arab States, was said to be out "for a variety of obvious reasons."

The US officials said there had been no engineering studies of the project nor an estimate of its cost. It was held that the total cost of the northern tier highway would not necessarily come entirely from Eisenhower Middle East Fund. Local labour costs would be supplied by the Baghdad Powers themselves and such international leading agencies as the World Bank might be interested in a share of the cost.

have decided on July 29, 1958, to strengthen its ties with other "defensive organisations," such as NATO, SEATO and the OAS (organisation of American States).

Headquarter shifted to Ankara. It was announced on October 24, 1958, that provisional headquarters of the Baghdad Pact, together with the records of the pact, were shifted to Ankara.

USA not likely to displease India. It was reported on January 30, 1959, that the United States will not, under any circumstances, give guarantees against non-Communist aggression, which, translated in Pakistan's context, means that the United States will never give Pakistan a guarantee against aggression by India.

"This is truth that the United States policy is based on what is best for the United States and not on what is best for her allies..."

"India is an enormous country, and the view here (the USA) is that it is second biggest country in the world, only second to China and that India's importance in Asia, the importance of her economic and social progress, is paramount if it succeeds in Asia. If it fails, all Asia is expected to go Communist in a few years. This is how the United States foreign policy experts view the situation and that is why no amount of insistence or of pact joining by Pakistan or other countries will succeed in changing the course of the United States policy, guarantees will be given against Communist aggression but not against non-Communist. This applies to Iran as well, which reportedly means guarantees against non-Communist aggression, meaning the Arabs, and the United States won't do," the report said.

CENTO, new name. The first name of the pact was Turco-Iraq Pact. This name was later on changed to Baghdad Pact. The latest name of the Pact is CENTO (Central Treaty Organisation).

Joint CENTO Military Command. Military Commanders of CENTO member-nations met at Teheran in a two-day meeting on March 28, 1960, to discuss, among

other subjects, ways of equipping CENTO with a regional military structure. The Military Committee, it was reported, was to concentrate particularly on ways of bringing better co-operation between the Pact's armed forces as well as setting up a unified CENTO Military Command. Among those attending the Military Committee meetings was U. S. Air Force Chief, Head of Britain's Defence Staff.

The United States indicated coolness towards the proposal. The States Department spokesman stated that the Department expected no "imminent deve opments" along this line. Later on, it was reported that it was unlikely to establish a joint military command in the near future.

Tasks before CENTO. The CENTO Ministerial Council met at Teheran towards the end of April, 1960. In a communique the Council re-affirmed their belief that free countries of the wor'd must maintain their strength and solidarity as expressed particularly in the regional organisations to which they belonged. Need for this was clear. For example, hostile propaganda campaigns were directed from outside area against particular countries and this was inconsistent with the declared purpose of a *detente*.

The participating States re-affirmed their intention to maintain friendly relations with all neighbouring States, based on mutual interest and respect. They believed all questions at issue between them and their neigh ours could be solved by discussion as between equals. It was a matter of deep concern to them that such questions were sometimes used by outside Powers as a means of interfering in internal affairs of other countries and increasing international tension and subversion, as for example, anti-Pakistan statements on 'Pakhtoonistan' by Soviet Russia.

The Council emphasised the desirability of proceeding as rapidly as possible with the execution of approved joint projects especially those in the field of communications and public works and others contributing to the raising of standard of living in regional countries of the CENTO. Growth of technical co-operation between the participating States was noted with satisfaction under the auspices

of Economic Committee. New areas of technical advance were being explored and help was being given to regional countries in surveying and developing the natural resources.

CENTO microwave system. The instalment of the CENTO microwave system between Karachi and Ankara *via* Teheran was started in the last quarter of 1962. This microwave system is the largest single network of its kind in the world. It started working in April, 1964.

Under the arrangement between CENTO, Pakistan and the United States, the Pakistan Government is responsible for the construction of buildings and approach roads to 23 transmission stations inside Pakistan while the RCA International Division is responsible for the installation of the operating equipment and towers for the stations in Pakistan, Iran and Turkey. In all 45 stations were established in Iran and 20 in Turkey. The Pakistan section of CENTO project was completed in 1963. The microwave system was opened for public use by April, 1964. From July, 1963 to April, 1964 the system was put to various kinds of tests. Work on the project started in February, 1964 when the RCA International Division carried out surveys to select the sites of the stations.

In case, Pakistan decided to set up a television transmiter the CENTO microwave project would also enable the country's television programmes to be conveyed to Tehran, Ankara and Europe.

The Manager, CENTO Microwave Project, Pakistan, said that European TV programme could be televised in all important cities of West following the Government's decision to link Lahore, Rawalpindi and Peshawar with the CENTO microwave system. The link is expected to be completed in one and a half years' time. Karachi, Hyderabad, Sukkur and Quetta are already covered by the CENTO project.

With the completion of CENTO project, Pakistan would not only be linked with Ankara but also with Europe since Turkey is already connected with the European wireless network.

Besides, the CENTO project would provide an efficient and cheap wireless connection between Karachi, Teheran and Ankara which would make it possible to make 600 telephone calls simultaneously.

CENTO and SEATO in new perspective. With the rush of arms by the West to 'neutralist'' India and in November and December 1962 the American sponsored defence pacts, CENTO and SEATO assumed a new perspective. India's acceptance of America's offer of massive military equipment against Communism served the purpose of both America and India. There was a real heart searching in Pakistan as to the desirability of having military alliances if one could get arms at the mere bid to fight Communism.

Even for the Western Powers, SEATO and CENTO are not of much significance now when even a country like India is prepared to tow their line and fight Communism with arms supplied by them.

What, in fact, has emerged out of Sino-Indian conflict is that the CENTO and SEATO countries are in a less happy position than the 'neutralist' ones when the situation actually arises to defend themselves against a Communist threat. These pact countries a e probably just to carry out the American instructions to part with their equipment and to allow passage for this equipment for otherwise anti-pact countries, when suddenly they need this equipment to repel Communism. This is what is happening with Turkey and Iran and this is exactly how America wants to deal with Pakistan also.

The Sino-Indian conflict has helped America to realise its long-cherised dream, that is, to find India in a position in which she will accept American arms and supervision. It has also helped China to push India into the American fold and thus to completely drive her away

from the USSR which had started greater flirtation with India than with China. It has also helped India to get overnight massive military aid from the West without losing face, of course, on the pretext of defending her own soil but in effect serving the motives of the United States.

The conflict between China and India will undoubtedly be a long drawn out one and keep these two big Asian countries engaged against each other, probably to the benefit of both America and Russia. But the smaller nations in the region and the CENTO and SEATO members will find coming days really hard for them because the Sino-Indian conflict, which India will prolong with the assistance of American arms, will create an extremely dangerous situation.

It is for these reasons that the present situation is more complex and more difficult for countries like Pakistan, Turkey and Iran rather than for India which, after blasting American policies for the last 14 years, is now tightly hugged by the West and may be that these nations start thinking to dismantle or to get out of these pacts where the Western Powers sit as overlords.

SOUTH-EAST ASIAN TREATY ORGANISATION (SEATO)

SEATO (South-East Asian Treaty Organisation), also known as SEADO (South-East Asian Defence Organisation), is a defence alliance against Communism in South-East Asia. It may be called a NATO of the Far East. Its aim is to prevent the Communists from expanding into the Far East, country by country. It is an East-Asia Locarno Pact to guard against aggression. It may be recalled that the Locarno Pact was signed in 1925 among Britain, Germany, France and Itlay. Each country promised not to attack any other signatory and come to the defence of any one of those which might be attacked.

A communique jointly issued in April, 1954, from London and Washington said that Britain and the U.S.A. were ready with other interested parties to examine collective defence arrangements for South-East Asia and the Western Pacific. A South-East Asian Alliance, on the pattern of the North Atlantic Pact in Europe, was envisaged. On May 19, 1954, ex-President Eisenhower had expressed that it might be possible to have a workable South-East Asian Defence Pact without Britain. This statement annoyed U. K.

The Agreement. On September 8, 1954, the SEATO Pact was signed at Manila, by eight nations—Britain, the United States, France, Australia, New Zealand, Pakistan, the Philippines and Thailand.

The full text of the Treaty is as follows :

"The parties to this Treaty—

"Recognise sovereign equality of all parties.

"Retain their faith in purposes and principles set forth in the Charter of the United Nations and their desire to live in peace with all peoples and all Governments.

"Re-affirming that in accordance with the Charter of the United Nations they uphold the principles of equal rights and self-determination of the peoples and declaring that they will earnestly strive by every peaceful means to promote self-government and to secure independence of all countries whose peoples desire and are able to undertake its responsibilities.

"Intending to declare publicly and formally their sense of unity so that any potential aggressor will appreciate that the parties stand together in the area and desiring further to co-ordinate their efforts for collective defence for the preservation of peace and security, therefore, agree as follows :

Article 1. The parties undertake, as set forth in the Charter of the United Nations, to settle any international disputes in which they may be involved by peaceful means in such a manner that international peace and security and justice are not endangered and to refrain, in their international relations, from threat or use of force in any manner inconsistent with the purposes of the United Nations.

Article 2. In order to achieve more effectively the objectives of this Treaty, the parties separately and jointly by means of continuous and effective self-help and mutual aid, will maintain and develop their individual and collective capacity to resist armed attack and to prevent any counter-subversive acts from without against their territorial integrity and political stability.

Article 3. The parties undertake to strengthen their free institutions and to co-operate with one another in further development of the economic measures including technical assistance designed both to promote economic progress and social well-being and to further individual and collective efforts of the Governments towards these ends.

Article 4 (1). Each party recognises that aggression by means of armed attack or threat against any of the parties or against State or territory which the parties, by unanimous agreement, may hereafter designate, would endanger its own peace and safety and agree that it will, in that

event, act to meet the common danger in accordance with its constitutional processes. Measures taken under this paragraph shall be immediately reported to the Security Council of the United Nations

(2) If, in the opinion of any of the parties, inviolability or integrity of the territory or sovereignty or political independence of any party, in the Treaty area or any other State or territory, to which provisions of Paragraph 1 of this Article from time to time apply, is threatened in any way other than by armed attack or is affected or threatened by any fact or situation which might endanger peace of the area, the parties shall consult immediately in order to agree on the measures which should be taken for common defence.

(3) It is understood that no action on the territory of any State designated by unanimous agreement under Paragraph 1 of this Article or any territory so designated shall be taken except at the invitation, or with the consent, of the Government concerned.

Article 5. The parties hereby establish a Council on which each of them shall be represented to consider the matters concerning implementation of this Treaty.

The Council shall provide for consultation with regard to military and any other plannings as the situation obtaining in the Treaty area may, from time to time, require. The Council shall be organised so as to be able to meet at any time.

Article 6. The Treaty does not affect and shall not be interpreted as affecting in any way the rights and obligations of any of the parties under the Charter of the United Nations or responsibility of the United Nations for the maintenance of the international peace and security. Each party declares that none of international engagements, now in force between it and any other of the parties or any third party, is in conflict with the provisions of this Treaty and undertakes not to enter into any international engagement in conflict with this party.

Article 7. Any other State in a position to further the objectives of this Treaty and contribute to the security of

the area may, by unanimous agreement of the parties, be invited to accede to this Treaty. Any State so invited may become a party to the Treaty by depositing Instrument of Accession with the Government of the Republic of Philippines. The Government of the Republic of Philippines shall inform each of the parties of the deposit of each such instrument of accession.

Article 8. As used in this Treaty, the Treaty area is the general area of South-East Asia including also the entire territories of Asian parties and general area of the South-West Pacific not including Pacific area north of 21 degrees 30 minutes North Latitude. The parties may, by unanimous agreement, amend this Article to include the territory of any State according to this Treaty in accordance with Article 7 or otherwise to change the Treaty area.

Article 9. (1) This Treaty shall be deposited in the Archives of the Government of the Republic of Philippines. Duly certified copies thereof shall be transmitted by that Government to other signatories.

(2) The Treaty shall be ratified and its provisions carried out by the parties in accordance with their respective constitutional processes. The Instrument of Ratification shall be deposited as soon as possible with the Government of the Republic of Philippines which shall notify all other signatories of such deposit.

(3) The Treaty shall enter into force between the States which have ratified it as soon as the Instruments of Ratification of the majority of signatories shall have been deposited and shall come into effect with respect to each other State on the date of deposit of its Instrument of Ratification.

Article 10. This Treaty shall remain in force indefinitely, but any party may cease to be a party one year after its notice of denunciation has been given to the Government of the Republic of Philippines which shall inform the Governments of the other parties of the deposit of each notice of denunciation.

Article 11. English text of this Treaty is binding on the parties, but when the parties have agreed to the French

text thereof and have so notified the Government of the Republic of Philippines, the French text shall be equally authentic and binding on the parties.

To the Treaty text was added the following: "Understanding of the United States of America." It reads: "The delegation of the United States of America in signing the present Treaty does so with the understanding that its recognition of the effect of aggression and armed attack and its agreement with reference thereto in Article 4, Paragraph 1, apply only to a Communist aggression but affirms that in the event of other aggression or armed attack it will consult under provisions of the Article 4."

Bangkok Conference. The Treaty came into force on February 19, 1955, following the deposits of the Instruments of Ratification by the eight member-countries. The Foreign Ministers of SEATO Powers met in the first conference at Bangkok from February 22, to 25, 1955. The Council held six sessions under the chairmanship of Prince Wan Writhayakon, Foreign Minister of the Government of Thailand (Siam).

It was decided to set up a permanent headquarters in Bangkok and each of the eight SEATO Powers assigning a Resident-Ambassador to it. The headquarters will have three key groups:

1. A military group will prepare plans for halting possible armed aggression.
2. An anti-subversion group will co-ordinate action against infiltration by Communist agents.
3. An economic aid group will help and fight against hunger.

Each member-State will send one representative to each of these three groups. Besides working with their groups, these representatives also form part of their own country's delegation.

Each State also has its own secretariat and there is an international secretariat as well.

The Foreign Ministers reached full agreement on the task of the military group. Their job will be to visit each of the member-States in South-East Asia and then to make

plans for local defence, while studying ways of protecting the whole area.

Communique. The Foreign Ministers of SEATO Powers issued a communique at the end of their three-day meeting in Bangkok. They reiterated that such military arrangements as they might make would be purely defensive in accordance with their international obligations and would never be used for purposes of aggression.

The Council affirmed the aim of the Governments—as set forth in the Pacific Charter—to uphold the principles of equal rights and self-determination of people ; to promote self-government and to secure the independence of all countries whose people desired it and were able to undertake its responsibilities ; to continue to co-operate in the economic, social and cultural fields in order to promote higher living standards, economic progress and social well-being in the region and to prevent or counter, by appropriate means, any attempt in the Treaty area to subvert their freedom or to destroy their sovereignty or territorial integrity.

They believed that the Manila Treaty, which set up SEATO, was already exerting a positive influence for the maintenance of peace in South-East Asia and South-West Pacific and the solidarity of the nations shown as the Bangkok Conference would serve as an increasingly powerful deterrent against aggression.

The Council recognised the continuing dangers to peace and security in the Treaty area and agreed that these Treaties made it imperative that the member-Governments took steps to strengthen the common defence. The Council discussed specific attempts by elements directed from outside to subvert free institutions and Governments in the Treaty area and decided to arrange for continuing consultation and mutual assistance and to make it possible for each member-Government to draw upon the experience of others in dealing with that danger.

Military advisors' defence talks. The SEATO military advisers met in Bangkok on July 6, 1955, to plan the defence of South-East Asia against the threat of

Communism. Some 50 military advisers from the member-nations were reported to have considered recommendations of the staff planners who had met in Baguio, Philippines, in May 1955, so as to co-operate on measures of defence and maintenance of permanent peace and security in that part of the world as stated in the Treaty.

Karachi talks. On September 26, 1955, the *ad hoc* Training Sub-Committee of the South-East Asian Collective Defence Treaty Organisation began its seven-day deliberations. The importance of training was emphasised.

In a four-day Karachi Conference of SEATO experts it was agreed that advanced countries in the organisation should make special efforts of speedy economic development of their under-developed partners.

On October 4, 1955, the Australian Minister for External Affairs ruled out in Karachi possibilities of setting up a joint military command under the SEATO. He said that "there was no such possibility unless there is a hot war."

Military chiefs' talks. The SEATO military chiefs' talks, ended on November 18, 1955, a fortnight's talks in Honolulu on the defence of the area. They expressed satisfaction over the progress made. But they did not reveal the details of the plans.

SEATO command. The eight Manila Pact nations considered, in the beginning of November, 1955, the creation of a new streamlined military command to co-ordinate all phases of their defence in the South-East Asia. It was expected that they would take a substantial step towards setting up this joint command of land, sea and air forces of the member-nations.

Plans to meet aggression. On November 8, 1955, SEATO military staff planners were reported to have made detailed plans for meeting Communist aggression in South-East Asia. The delegates of the member-nations had already approved reports on logistics, intelligence, training, psychological warfare and counter-subversion.

SEATO conference. The South-East Asian Treaty Organisation concluded its second meeting held in Karachi

from the March 6 to March 8, 1956. The meeting was attended by the Foreign Ministers of Australia, France, New Zealand, Pakistan, the Philippines, Thailand and the United States.

In a communique, the Council members re-affirmed their Governments' support for the United Nations Charter. They also re-affirmed the dedication of member-Governments to the objectives of the Treaty and of the Pacific Charter to strengthen the fabric of peace and freedom, to co-ordinate their efforts for collective defence for the preservation of peace and security, to uphold the principles to equal rights and self-determination of peoples in accordance with the Charter of the United Nations.

The Council agreed that the Treaty and the progress of the Treaty Organisation had made a notable contribution to the maintenance of peace in the area. The healthy political developments of the past year had been noted with satisfaction. It was agreed that steady economic progress had been achieved among the members. There had been useful progress in co-operation among member-Governments in assisting each other to combat subversive activities.

They particularly deplored statements and intervention by Soviet leaders to increase tension and promote division in the Asian Communities and among other nations of the free world. As regards the statement pertaining to Pakhtoonistan, the members of the Council severally declared that their Governments recognised that the sovereignty of Pakistan extends up to the Durand Line, the international boundary line between Pakistan and Afghanistan.

They viewed with satisfaction that the defence forces of the member-nations had appreciably improved since the signing of the Treaty and were better equipped and developed to act in an emergency. The Council approved measures to strengthen the organisation and facilitate the Council representatives' plans of work for the coming year. Economic plans of the committee of experts working under the Council representatives were approved. Certain organisational decisions were also taken. It also decided

to establish headquarters of the organisation at Bangkok. The meeting of the Foreign Ministers also decided to establish at Bangkok several SEATO bodies : a Regional Research Centre to produce, for the benefit of member-Governments and of other bodies within SEATO, analysis of current developments in Communist activities ; a Cultural Relations Office ; a Public Relations Office, and an Executive Secretariat to assist the representatives of the Treaty Governments.

The Karachi meeting also decided to establish at Bangkok permanent working group consisting of a representative from each of the eight countries, working under the general direction of the Council Representatives. The working group would also allow continuous work to be done on problems facing SEATO, without meetings of specialist committees or having to take everything to highest level.

Aims of SEATO. The Australian Minister for External Affairs, explaining the aims of SEATO Conference said that the SEATO had three distinct aspects :—

(i) Mutual defensive arrangements on the military side of SEATO ;

(ii) Anti-subversive side, *i.e.*, measures to guard against Communist infiltration, particularly in the threatened areas of South-East Asia ; and

(iii) Economic aid to countries whenever needed or asked.

SEATO headquarters. On June 26, 1956, the headquarters of the South-East Asian Treaty Organisation were formally opened in Bangkok (Thailand). The SEATO Council of Foreign Ministers held at Karachi in March 1955 had decided to establish headquarters of the organisation at Bangkok.

Progress made in SEATO area's defence. The Chief of Staff of the Royal Australian Air Force, in the Conference of SEATO military advisers said on September 2, 1956, that considerable progress had been made in the

forging of the Treaty area defence. Giving several tangible achievements to prove that preparations had been progressive and continuous, he cited :

1. The build-up and training of individual strength and capability in accordance with modern concept of mobility and flexibility.

2. The forging of bilateral agreements geared towards the idea of more powerful helping the not-so-powerful.

3. The holding of SEATO manoeuvres the latest of which were held in Australian waters in the latter part of September, 1956.

4. The continuous building of confidence in the Treaty area.

He said one could not expect SEATO to pattern its defence after that of the North Atlantic Treaty Organisation countries which had amassed forces in one place, because the circumstances in that Treaty area were different.

He said the main point in the preparation of the Treaty area's defence was the build-up of individual strength from which troops could be pulled out to aid any member-country in distress "at a moment's notice."

SEATO exercises. Eighteen warships of five South-East Asia Treaty Organisation (SEATO) countries converged on a rendezvous in the South China Seas in September, 1956 in the biggest exercise held in Far Eastern waters since World War II. It was a month-long exercise. The SEATO countries taking part in the exercise were Australia, New Zealand, Pakistan, Britain and the United States. In the later phase of the exercise ships from the Philippines and Thailand, aircraft of the British Far Eastern Force and American aircraft also took part. The area of the exercise was South China Seas, the Gulf of Thailand, shipping lanes between Bangkok and Hong-Kong, etc.

(ii) The SEATO exercise of "Aid Progress" began at Donmuang, on March 2, 1958, with six SEATO member-nations participating and observers from six other countrier. Planes from Thai Royal Air Force, the United

States, France, United Kingdom, Australia and New Zealand took part in the exercise in conjunction with Thai ground forces.

Russian comments. The Soviet Government newspaper *Izvestia* commenting on the SEATO exercise said : 'The manœuvres have met with open indignation from the peoples of South-East Asia and especially Indonesia, near which the first stage of the manœuvre was held.'' The SEATO calculated that a demonstration of military force would help them improve the shaky position of this aggressive grouping in South-East. The hopes are fertile.

SEATO's effectiveness. The Professor of Political Science, Duke University (of the United States) and a delegate to the International Pacific Relations Conference, while on tour in Pakistan, stated that the SEATO was an ineffective organisation having doubtful value as a security shield and little scope for economic co-operation among the signatories.

Analysing the provisions of the Manila Pact, the Professor at the very outset observed that it was wrong to compare SEATO with NATO because the two treaties were conceived and born in different circumstances. They were no doubt two versions of the regional security pacts, but to compare the two would only be indulging in an illusion though it might give some aesthetic satisfaction.

He said that unlike NATO which had a clause that armed aggression against one of its members would be considered aggression against all, the SEATO signatories were not committed to go to the aid of a member-country in the case of an armed aggression The obligations of the signatories under the Manila Pact were not uniform. The United States, for instance, was committed to help a member-country only in the event of a Communist aggression. She was not committed to help a member-country, when the aggressor was a non-Communist country.

Again, unlike the NATO treaty, under which the United States President was empowered to straightaway order movement of troops to help the member-country in case of aggression, without going through the constitutional

processes and making formal declaration of war, under the SEATO arrangements even where the United States felt committed to help a member-country, the President must observe the constitutional process and get a formal declaration of war against the aggressor from the Congress.

He said that under the United States' constitution only the Congress was competent to declare war against a country. This meant dependence on favourable political opinion in the United States about which there could be a large amount of uncertainty at any given moment.

Continuing, the delegate said that the other signatories to the Manila Pact were also bound by constitutional processes and one of them could go to the assistance of the other only if the Government of that country got the approval of the national Parliament. In the case of the Commonwealth countries the position was even more difficult. No Commonwealth country, according to the Articles of Commonwealth Association, should go to war against another Commonwealth country. And it was in view of this fundamental principle that the Commonwealth countries, like the U. K., Australia and New Zealand, who were members of the SEATO, had made it clear that in case there was a war between two Commonwealth countries, say India and Pakistan, each of these countries, whatever her obligations under the SEATO, would be free to decide whether it would like to go to the help of Pakistan or not. He observed that U. S. being committed to resist only Communist aggression and U. K., Australia and New Zealand being members of the Commonwealth, the only countries that could come to the aid of Pakistan in the possible event of Indian aggression against her, would be France, Thailand and Philippines.

Speaking about the economic co-operation between the signatories of SEATO, the delegate said that to his mind there was always very little scope for economic help within the framework of a security organisation which was primarily a military organisation. The SEATO was no exception.

He said that the immediate purpose of SEATO was to prevent aggression in South Viet Nam by presenting to the Soviet Union unanimity of opinion in the area on that issue. The advantage was more of a psychological than material or technical nature. For they agreed that technically bilateral security treaties between the United States and other countries would have been as effective.

SEATO's Fourth Conference

The 3-day session of the 4th SEATO Conference took place at Manila on March 11, 1958. The members discussed military and political problems of the area.

The U.S. Secretary of State, Mr. Dulles, strongly reaffirmed America's stand for not recognising Communist China and opposing her entry into the U.N. Some of the Pact members claimed increased economic aid, and criticised American "pampering" of Asian neutral countries. Mr. Dulles expalined the allocation of aid by insisting on the importance of preventing neutral countries from losing their independence to Communist Powers. He told Pakistan, Thailand and Philippines that they would have to content themselves with a small increase in the U.S. contribution to training centres and with the military assistance of Australia.

Russian comment on SEATO. On October 26, 1958, the Soviet Communist Party newspaper *Pravda* stated that the military organs of SEATO were developing considerably in building up tension in the regions of South-East Asia. It said: "Contrary to the Geneva Agreement they are converting the territory of South Viet Nam into a military basis of the alliance and instigating subversive activities in Cambodia and Laos. They aim at creating conditions in Kashmir similar to those prevailing on the border between Syria and Turkey so as to provoke a conflict between India and Pakistan. The whole activity of the SEATO bloc is aimed at building up a new American colonial empire on the basis of the old slavery."

A serious blow to SEATO. On August 17, 1958, Mr. Chou En-Lai, the Chinese Premier commenting on Cambodia's recognition of China said at Hong Kong that the SEATO had suffered a severe blow. He added : "Aggressive designs of the Manila Treaty bloc have been frustrated by Cambodia's recognition of China." He further said, "Iraq's victory dismembered the Baghdad Pact and the disintegration of NATO is more evident."

SEATO sought Baghdad Pact and NATO nations accord. While on tour in Pakistan, in January, 1959, the Secretary-General of SEATO, Mr. Pote Sarasin disclosed in an interview that the SEATO, was seeking increased co-operation and exchange of information with the CENTO Pact countries.

The Secretary-General, when asked whether SEATO would in any manner help Pakistan in solving its Kashmir and Canal Water Disputes with India, replied, "I don't think it is in the jurisdiction of the SEATO".

He said he had conferred with the Secretary-General of the CENTO Pact and NATO in an exchange of information of "common interest". He remarked that SEATO was working satisfactorily.

SEATO against U.S. recognition of China. He was also reported to have said that U.S. recognition of China would seriously affect SEATO and the other "free" countries of Asia. It would open the door to Chinese penetration of the 10 million Chinese who lived in neighbouring Asian countries.

He said that peace and security in Asia were vital to America's peace and security. "The United States cannot be indifferent to Asia."

Stability of SEATO area. On February 9, 1959, the Secretary-General of SEATO stated that the collective defence under the Treaty had deferred aggression in the area.

He rejected a suggestion that the recently installed military governments had done away with freedom. The people were "quite happy and also free," he said. You can go to Pakistan, Burma, Thailand, the people

are just as free as anyone," Mr. Sarasin said. However, he did not think the "dictatorship" would be there for an indefinite period. Mr. Sarasin was asked whether the stability he spoke of helped to bring about these strong dictatorships.

He replied: "The object of SEATO is to resist any aggression and to counter-subversion. That means that it will bring stability, safety, and sovereignty to the countries.........

"There exists, I am convinced, in all the Asian countries, the determination of the peoples to be governed by themselves. But you see it will take a long time........... I think it is moving in that direction."

Stress on Communist threat to SEATO states. The Ministerial Council of SEATO said on June 3, 1960, in a communique that Communism threatened militarily the independence of the SEATO countries.

"In their frank exchange of views on the subject," the communique added, "the Council members gave particular attention to the intensification during the past years of Communist subversion, insurgency and terrorism in several countries of the Treaty area, as well as the protential threat of armed aggression." 'Several countries' in the above sentence referred in particular to the situation in Laos and to a lesser degree to that in South Viet Nam.

The Council emphasised what was described as the firm unity of purpose of the member-countries of the SEATO and their determination to maintain and develop, both individually and collectively, their capacity to meet all forms of Communist aggression to the peace and security of the Treaty area.

The Council further recognised that the Communists challenge "not only a potential military threat to the independence of countries in the Treaty area but also an immediate and direct threat to their cultures and ways of life."

The members of the Council re-stated their firm belief that while military preparedness to meet armed aggression was essential in the work of Treaty Organisation "true and complete defence against aggression must be found in the minds and spirits of men." For this reason, the communique went on, the Treaty-members were also directing their efforts towards mutual support in the economic, educational and cultural fields.

India's secret link with SEATO. The United States secret agreement for arms supply to India came into effect from March 16, 1951. This pact, in effect, made India member of a pact for the security of the region, a purpose for which the South-East Asian Treaty Organisation came into being three years later. The details have been given in a separate topic entitled "Indo-U.S Military Pact, 1951."

SEATO in a critical phase. The United Nations felt in October 1962 that the South-East Asian Treaty Organisation (SEATO) was going through a critical period. It was stated, there are hints from within its own ranks that it may collapse or, at best, become little more than an alliance on paper.

"A consensus of views in U.N. diplomatic circles is that SEATO will survive but that it will never be the powerful, moral, political and military force its founders had in mind eight years ago.

SEATO's members are Pakistan, the Philippines, Thailand, Australia, New Zealand, Britain, France and the United States.

The heart of the SEATO problem is the fact that its Asian members are discouraged, at times bitterly, over what they consider shabby treatment by their Western allies, the United States in particular."

Pakistan made no secret of her displeasure over attention paid by the United States and other allies to neutral countries especially India. Thailand had been even more outspoken than Pakistan in her resentment of the United States' policy and what she believed to be United States' neglect of its allies.

The Philippine attitude toward SEATO was, however, somewhat different from that of Thailand or Pakistan. She felt that SEATO still served a useful function and should be maintained as long as there was any threat of aggression or subversion in the region. It was further stated that the very existence of SEATO made it possible for the United States to send troops into South-East Asian countries promptly on arising a threatening situation in the area.

In balance, it appeared that "SEATO's effectiveness has been impaired by these differences, but that the alliance is far from dead."

Pakistan and SEATO. The Pakistan Times dated December 7, 1962 in its editorial stated "Thoughtful Pakistanis have always been sceptical of SEATO's value to Pakistan. They have argued with much force, that this alliance provides us no protection against Indian aggression, our principal worry—and unnecassarily spoils our relations with a powerful—and far from hostile—neighbour." Large-scale military aid to India by U.S. and Britain upset the balance of power in the region. Following their big catch—India—the Anglo-American strategy underwent a marked change and they felt that they could dispense with Pakistan.

The editorial stated further: It is relevant to ask what blessings SEATO membership has brought us. It certainly had not made us secure against India from where the main threat omanates. In fact, this threat has become sharper with the massive military aid which our SEATO allies are now heaping on India. The arms build-up is likely to continue because it appears to be the U.S. aim to keep the Sino-Indian conflict smouldering. While no substantial benefits have accrued to Pakistan from SEATO membership, it has actually brought dangers. On more than one occasion Pakistan was under heavy pressure to send troops to fight in a civil war in far off-lands. Again Pakistan's membership of SEATO has caused understandable annoyance to China with which we have no dispute and from whom we have no reason to fear aggression.

5

THE ANZUS PACIFIC PACT

The three-nation Pacific Security Pact known as ANZUS (Australia, New Zealand and U.S.) defence group was signed by the United States, Australia and New Zealand on July 12, 1951.

The Pact emerged when Australia and New Zealand expressed anxiety over rearmed Japan and the United States agreed to secure them against any possible consequences of such rearmament. The Security Treaty consists of eleven articles. It went into effect immedialely after the Peace Treaty with Japan was concluded.

The ANZUS Pact provides for establishment of a Council of the three nations' Foreign Ministers to their deputies to implement it.

Preamble. The preamble to the Treaty states that the parties desire to "declare publicly and formally their sense of unity so that no potential aggressor could be under the illusion that any of them stands alone in the Pacific."

It also states that the parties want a further co-ordination of their collective defence efforts for the preservation of peace and security pending the development of a more comprehensive regional security system in the Pacific area.

The preamble reaffirms the faith of the three parties in the purposes and principles of the United Nations Charter and their desire to strengthen the fabric of peace in the Pacific.

It noted that the United States, on coming into force of the Japanese Peace Treaty, might station armed forces in and around Japan to assist in the preservation of peace and security in the area.

It recognises that Australia and New Zealand as members of the Commonwealth, have military obligations outside as well as within the Pacific.

Treaty provisions. The Treaty provisions are as follows :

Article 1. The parties undertake, as in the Charter of the United Nations, to settle any international disputes in which they may become involved in such a manner that international peace, security and justice will not be endangered and to refrain from threats or the use of force in a manner not consistent with the purposes of the United Nations.

Article 2. The parties separately and jointly, by means of continuous and effective self-help and mutual aid, shall maintain and develop their individual and collective capacity to resist armed attack.

Article 3. The parties shall help mutual consultations in the event the territorial integrity, political independence and security of any of them is threatened in the Pacific.

Article 4. Each party shall recognize that an armed attack in the Pacific area on any of the parties would be dangerous to its own peace and safety and shall act to meet common danger.

Such an attack and resulting measures taken to meet it shall be immediatley reported to the United Nations Security Council. Such measures shall mean to restore and maintain international peace and security.

Article 5. ARMED ATTACK. For purposes of Article Four, an armed attack shall be deemed to include an armed attack on the metropolitan territory of any of the parties or on island territories under its jurisdiction in the Pacific or on its armed forces, public vessels or aircraft in the Pacific.

Article 6. The Treaty does not affect and shall not be interpreted affecting in any way the rights and obligations of the parties under the United Nations Charter or the responsibility of the United Nations for the maintenance of international peace and security.

Article 7. A Council of Foreign Ministers or the deputies of the parties shall be established to consider matters concerning the implementation of the Treaty. The Council shall be organised so as to be able to meet at any time.

Article 8. The Council of Foreign Ministers is authorised to maintain consultative relationship with other authorities in the Pacific area in order to further the purposes of the Treaty.

Article 9. The Treaty shall be ratified by the parties according to their constitutions.

Article 10. Provides that this Treaty shall remain in force indefinitely.

Britain not included. Exclusion of Britain from the group has long irritated the British. Australia and New Zealand supported Britain in her claim to membership of the ANZUS Council, the governing body of the Pacific Pact. Britain has not so far succeeded to get herself included in the ANZUS Pacific Pact. Exclusion of Britain from the Pact has been a bone of contention in Anglo-American relations. There have been unsuccessful attempts to include Britain in the ANZUS Pact indirectly, through the NATO-ANZUS link-up and ANZAM Pact.

NATO-ANZUS link up. Sir Winston Churchill disclosed that a proposal for close co-ordination between NATO and ANZUS defence group 'sounds very good." Lord Ismay, General Secretary of NATO, stressed the need for co-ordination between NATO; ANZUS and added that the business could only be done on a global basis.

From ANZUS to ANZAM. There was a proposal to extend the ANZUS Agreement by a further pact to include (British-controlled) Malaya. The proposed agreement named as ANZAM, was held to be a workable compromise which would overcome British objection that she was not included in the ANZUS. But in September, 1953, the Foreign Minis·ers of Australia, New Zealand and the United States decided against broadening the tripartite

ANZUS Pacific Defence Pact for admitting Britain or any other country. "The Council affirmed its readiness to consider any measures which would strengthen the defence of the area. It unanimously concluded, however, that its attempt to enlarge its membership would not contribute directly and materially to this end." It seemed to them that what was needed in the Pacific was not a fruitless difference about the constitution of ANZUS, but on a practical level co-ordinating defence planning in a realistic way between the relevant Pacific Powers. Australia understood and sympathised with the desire of Britain to be associated in ANZUS, but she refused to break up the ANZUS Pact to please Britain who did not like the Pact at all. America held that the Pact was more of a guarantee to America and New Zealand to relieve their fears on the eve of the signing of the Japanese treaty than a basis for a "Pacific NATO."

Non-inclusion of U.K. in the ANZUS Pact was resented by Britian which felt deeply hurt over its continued exclusion from the Pact. It was expressed that to add insult to injury the ANZUS Powers expected Britain to fit her Far Eastern policies into arrangements they made under American guidance. Britain was brought into line, perhaps reluctantly, with the ANZUS view of Far East. It expressed her agreement with their policy to bar Communist China from the United Nations at least during 1953.

6

INDO-U.S. MILITARY PACT OF 1951

The United States' secret agreement for arms supply to India which became effective from March 16, 1951 came to the knowledge of Pakistan in 1962. It was discussed in the National Assembly on November 23, 1962. It was exposed that India had been masquerading as a neutralist while quietly allied to America militarily since long.

The mutual defence assistance pact between India and the United States resulted out of an exchange of Notes between the then American Acting Secretary of State, Mr. James E Webb, and the Indian Ambassador, Mrs. Vijayalakshmi Pandit on March 7, 1951. In Mrs. Pandit's letter, she had requested the United States Government for "transfer of certain unspecified items of military supplies and equipment" to India. According to the agreement, "the terms of payment" were to be "agreed upon between" the two Governments.

According to the documents, the Government of Mr. Jawaharlal Nehru gave "certain assurances and undertakings" to the United States before the arms were made available to it. The interesting undertaking was that the American arms were required by India "to permit India to participate in the defence of the area of which she is a part and that India will not undertake any aggression against any other state."

In her letter of March 16, 1951, the then Indian Ambassador in Washington, Mrs. Pandit, assured the United States Government that "the terms, conditions and assurances affecting the arms assistance have been carefully considered." She said further that the Government of India are in agreement with the terms, conditions and assurances proposed."

TEXT OF LETTERS

Following is the text of the letters exchanged between the then Acting Secretary of State Mr. James Webb, and Mrs. Vijayalakshmi Pandit. The letters were released to the Press by the United States Embassy on November 3, 1962.

The first letter dated 7th March, 1951 was sent by Mr. James to the Indian Ambassador.

" I have the honour to address your Excellency concerning the request of the Government of India for the transfer of certain items of military supplies and equipment by the Government of the United States of America. There are certain assurances and undertakings by the Government of India which the Government of the United States of America must obtain before completing any transaction under Section 408 (E) of the Mutual Defence Assistance Act 1949 (Public Law 329, 81st Congress) as amended by Public Law 821, 81st Congress.

"The Government of the United States of America understands that the Government of India is prepared to agree to use such items as may be provided to foster international peace and security within the framework of the Charter of the United Nations through measures which will further the ability of nations dedicated to the principles and purposes of the Charter to participate effectively in arrangements for individual and collective self-defence in support of these purposes and principles, and, moreover, that the items to be provided by the Government of the United States of America are required by the Government of India to maintain its internal security, its legitimate self-defence or permit it to participate in the defence of the area of which it is a part, and that it will not undertake any act af aggression against any other State.

" The Government of the United States of America understands also that the Government of India will obtain the consent of the Government of the United States of America prior to the transfer of title to or possession of any equipment, material information or services furnished,

will take appropriate measures to protect the security of any articles, service or information furnished and agrees to the Government of the United States of America's retaining the privilege of diverting items of equipment or of not completing services undertaken if such action is dictated by considerations of United States' national interest.

"Finally, the Government of the United States of America understands that the Government of India is prepared to accept terms and conditions of payment for the items transferred, to be agreed upon between the Government of the United States of America and the Government of India, which accord with the terms of Section 408 (E) of the Mutual Defence Assistance Act of 1949 as amended.

"A reply to the effect that these understandings are correct will be considered as constituting an agreement between the Government of the United States of America and the Government of India which shall come into force on the date of the Note in reply from the Government of India.

"Accept, your Excellency, the renewed assurances of my highest consideration.

VIJAYALAKSHMI'S REPLY

Following is the text of Mrs. Vijayalakshmi's letter to Mr. James Webb.

The Ambassador of India to the Secretary of State,

Embassy of India, Washington.

March 16, 1961.

Mr. Secretary,

"I have the honour to refer to your letter dated 7th March, regarding the transfer of certain items of military supplies and equipment by the Government of the United States of America to the Government of India under the terms, assurances and undertakings which are to the effect as follows:

The Government of the United States of America understands the Government of India is prepared to agree to use such items as may be provided to foster internal peace and security within the framewo k of the Charter of the United Nations through measures which will further the ability of nations dedicated to the principles and purposes of the Charter to participate effectively in arrangements for individual and collective self-defence in support of those purposes and principles and, moreover, that the items to be provided by the Government of the United States of America are required by the Government of India to maintain its internal security, its legitimate self-defence or permit it to participate in the defence of the area of which it is a part, and that it will not undertake any act of aggression against any other State.

The Government of the United States of America understands also that the Government of India will obtain the consent of the Government of the United States of America, prior to the transfer of title to or possession of any equipment, materials, information or services furnished, will take appropriate measures to protect the security of any article, service or information furnished and agrees to the Government of the United States of America's retaining the privilege of diverting items of equipment or of not completing services undertaken if such action is dictated by considerations of United States' national interest.

Finally, the Government of the United States of America understands that the Government of India is prepared to accept the terms and conditions of payments for the items transferred to be agreed upon between the Government of the United States of America and the Government of India, which accord with the terms of section 408 (E) of the Mutual Defence Assistance Act, of 1949, affecting such a transfer as quoted above have been carefully considered and I have the honour to inform you that the Government of India are in agreement with the terms, conditions and assurances proposed and avail myself of the opportunity, to convey to you, Mr. Secretary,

the assurances of my highest consideration—Vijayalakshmi Pandit, Ambassador of India."

Indian confirmation sought. On April 16, 1958 Mr. K Winthrop G. Brown, United States Charge d' Affairs in New Delhi wrote another letter to Prime Minister Nehru asking for confirmation that the Indian Government considered the assurances contained in the note of 1951 applicable also to equipment furnished under the Mutual Security Act of 1954.

The same day the Indian Government replied to American Ambassador giving the confirmation:

The texts of the letters are as follows:

Mutual Defence Assistance Assurances: agreement effected by exchange of notes signed at New Delhi April 16 and December 17, 1958: entered into force on December 17, 1958.

The American Charge d' Affairs *ad interim* to the Minister for External Affairs of India.

The Foreign Service of the United States of America.

No. 544, New Delhi, April 16, 1958.

Excellency:

I have the honour to refer to the agreement between our two Governments effected by an exchange of notes signed in Washington on March 7 and 16, 1951.

(1) It is the understanding of my Government that Your Excellency's Government considers the assurances contained in that agreement regarding transactions under a Mutual Defence Assistance Act of 1949.

(2) As amended, to be applicable also to equipment, materials, information and services furnished under the Mutual Security Act of 1954.

(3) That Act, as amended from time to time, and such other applicable to United States laws as may come into effect.

I should appreciate it if Your Excellency's Government

would confirm the understanding of my Government as stated above.

Accept, Excellency, the renewed assurances of my highest consideration.

—K. Winthrop G. Brown.
Charge d' Affairs *'ad Interim* His Excellency
Jawaharlal Nehru,
Minister for External Affairs,
New Delhi.
The Foreign Secretary, Ministry of External Affairs of India, to the American Ambassador.

Ministry of External Affairs,
New Delhi.
December 17, 1958.
Foreign Secretary, No. Fs/7402.

Dear Mr. Ambassdor,

Please refer to the following letter to the Prime Minister from Mr. Winthrop G. Brown :

No. 544 New Delhi, April 16, 198.

I have the honour to refer to the agreement between our two Governments effected by an exchange of notes signed at Washington on March 7 and 16, 1951. It is the understanding of my Government that Your Excellency's Government considers the assurances contained in that agreement regarding transactions under the Mutual Defence Assistance Act of 1949, as amended to be applicable also to equipment, materials, information and services furnished under the Mutual Security Act of 1954, that Act as amended from time to time, and such other applicable to United States laws as may come into effect.

"I should appreciate it if Your Excellency's Government would confirm the understanding of my Government as stated above.

Accept, Excellency, the renewed assurances of my highest consideration.

Winthrop G. Brown Charge d' Affairs *'ad interim.*

His Excellency Jawaharlal Nehru, Minister for External Affairs, New Delhi."

2. I am directed by the Government of India to confirm that the Assurances contained in the agreement between our two Governments effected by an exchange of notes signed at Washington, March 7 and 16, 1951 are applicable also to supplies and services furnished to the Government of India by the Government of the United States of America under the Mutual Security Act of 1954 amended from time to time. I am to add that in fact, as is well-known, the firm policy of India is to work for international peace and on no account does the Government of India ever consider the possibility of aggression against any other State.

Accept, Excellency, the assurances of my highest consideration.

S. Dutt, Foreign Secretary,

His Excellency Mr. Ellsworth Bunker,

Ambassdor of the United States of America, New Delhi.—

Comments. Mr. Nehru accepted conditional U.S. military aid. It is interesting to note Pandit Jawahar Lal Nehru's declarations dated March 1, 1954 and March 25, 1954 which he made in the Lok Sabha (Indian Parliament). On March 1, 1954 ——— *i.e.* three years after he had signed the above agreement to receive military aid from America ——— he said, "We would be hypocrites and unprincipled opportunists to accept such aid (military aid given by U.S.A.) ourselves." On March 25 in the same year Nehru said that India would never purchase any arms from any country if any conditions open or hidden were attached to their sale. He declared, "I have said this before and I repeat it that we will never accept any such condition nor will we buy arms from any country if such conditions are attached to them." Nehru's declarations were recalled by observers to show the Indian Prime Minister's "hypocrisy and fraudulence" which he perpetuated all these years since his signing of the agreement with the U.S.A. in March, 1951.

7

TURCO-PAKISTAN ALLIANCE

No nation or country can preserve its freedom in the world today by merely parading its helplessness and proclaiming its "neutrality." Peace has to be maintained by means of military strength and by close, but cautious, co-operation with peace-loving nations. If neutrality had been possible a strong country, like America, would have been its greatest exponent. The world events forced her to discard its old isolationist policy and fully participate in the affairs of the world.

In the face of the surging danger of aggressive force, Turkey and Pakistan decided to co-operate in political, economic, cultural and defensive spheres. The conditions prevailing in the world today made it imperative that each country should build up as much as possible a defensive wall of might. The pact was not the result of any agressive ambitions of any country. The co-operation between Turkey and Pakistan is not directed against anyone. Its only aim is to preserve peace and security.

On April 2, 1954, Pakistan and Turkey signed at Karachi an agreement for friendly co-operation between the two countries. The pact was in recognition of the "need for consultation and co-operation between Turkey and Pakistan in every field for the purposes of promoting the well-being and security of their peoples."

The pact was in pursuance of the joint announcement made by the two Governments in February, 1954, expressing their desire "to study methods of achieving closer friendly collaboration in the political, economic and cultural spheres as well as of strengthening peace and security in their own interest as also in that of all peace-loving nations."

The Agreement. The full text of the agreement for friendly co-operation between Pakistan and Turkey is as follows :

"Reaffirming their faith in the purposes and principles of the Charter of the United Nations and their determination always to endeavour to apply, to give effect to these purposes and principles.

Desirous of promoting the benefits of greater mutual co-operation deriving from the sincere friendship happily existing between them.

Recognising the need for consultation and co-operation between them in every field for the purpose of promoting the well-being and security of their peoples.

Being convinced that such co operation would be to the interest of all peace-loving nations and in particular also to the interest of nations in the region of the contracting parties, and would consequently serve to ensure peace and security which are both indivisible.

Have, therefore, decided to conclude this agreement for friendly co-operation......have agreed as follows :

ARTICLE 1 : The contracting parties undertake to refrain from intervening in any way in internal affairs of each other and from participating in any alliance or activities directed against the other.

General Consultation and Co-operation.

ARTICLE 2 : The contracting parties will consult on international matters of mutual interest and taking into account international requirements and conditions, co-operate between them to the maximum extent.

ARTICLE 3 : The contracting parties will develop the co-operation already established between them in the economic and technical fields also by concluding' if necessary, other agreements."

Defence Co-operation.

ARTICLE 4 . The consultation and co-operation between the contracting parties in the field of defence shall cover the following points :

(*a*) Exchange of information for the purpose of deriving benefit jointly from technical experience and progress.

(*b*) Endeavours to meet, as far as possible, the requirements of the parties in the production of arms and ammunition.

(*c*) Studies and determination of the ways and extent of co-operation which might be effected between them in accordance with Article 51 of the Charter of the United Nations, should an unprovoked attack occur against them from outside."

Other Terms :

ARTICLE 5 : Each contracting party declares that none of the international engagements now in force between it and any third State is in conflict with the provisions of this agreement and this agreement shall not affect, nor can it be interpreted so as to affect the aforesaid engagements, and undertakes not to enter into any international engagement in conflict with this agreement.

ARTICLE 6 : Any State, whose participation is considered by the contracting parties useful for achieving the purposes of the present agreement, may accede to the present agreement under the same conditions and with the same obligations as the contracting parties.

Any accession shall have legal effect, after the Instrument of Accession is duly deposited with the Government of Turkey from the date of an official notification by the Government of Turkey to the Government of Pakistan.

ARTICLE 7 : This agreement, of which the English text is authentic, shall be ratified by the contracting parties in accordance with their respective constitutional processes and shall enter into force on the date of the exchange of the Instruments of Ratification in Ankara.

In case no formal notice o denunciation is given by one of the contracting parties to the other, one year before

the tremination of a period of five years from the date of its entry into force, the present agreement shall automatically continue in force for a further period of five years, and the same procedure will apply for subsequent periods thereafter.

In witness whereof, the above-mentioned plenipotentiaries have signed the present agreement.

Done in two copies at Karachi, the 2nd day of April, 1954."

Ratification of the pact. The Prime Minister of Pakistan reached Turkey on June 9, 1954, on a week's official visit to discuss with Turkish Government matters of common interest to Turkey and Pakistan.

The Turkish Grand National Assembly (Parliament) unanimously ratified the Turco-Pakistan Mutual Assistance Pact on June 11, 1954, in the presence of the visiting Pakistan Premier. On June 12, 1954, the Instruments of Ratification of the Agreement were exchanged at Ankara at a solemn ceremony between the Prime Ministers of Pakistan and Turkey.

Complete accord, on all points, with the Turkish Government during his discussions was announced by the then Prime Minister Mr. Muhammad Ali on June 12, 1954. It was stated that Turkey and Pakistan were to become closer "not only in cultural and economic fields but also in the fields of regional defence."

Comments. It was believed, in Turkey, that with the development of Turco-Pakistan military collaboration between Turkey and Pakistan, the nucleus for a future defence organisation for the countries of the northern perimeter of the Middle East would be established.

U.S.A. Formation of Turkish-Pakistan Alliance was considered in America as a vital necessity in view of the deteriorating situation in Egypt and other Arab countries which resented the failure to find some solution to the Anglo-Egyptian dispute over the Suez. U.S.A. welcomed the pact and considered it as "the most far-reaching

and important constructive step in the Middle East." The Turco-Pakistan Pact "marked one of the important developments in the United States diplomacy," said the *New York Daily Mirror*. Although the intense feelings between Israel and the Arab States in the Middle East are a bar to unity of action and a menace to the peace of the area, it was considered good to see the concept of mutual security take hold in the Middle East. Other countries might be induced by their example to help build a Middle East collective security system. American officials expressed hope that the Turkish-Pakistan security agreement would prove the nucleus for a broader alliance into which Iraq and Iran could be drawn.

The New York Times said: Turkey and Pakistan are at the two ends of a crescent that is still militarily weak and still striving for a genuine political stability. In their own strength and ability they are in potential anchor positions in a line that must be held. Obviously, they are and will be stronger in concert than they could do separately.

Russia felt disturbed over the Alliance and protested against it to Turkey and Pakistan individually. But Russia was told that the agreement was a co-operation for peaceful purposes between the two peaceful nations and was purely of a defensive nature

Iran was feeling inclined to join Turco-Pakistan defence alliance.

Afghanistan. "The conclusion of such a pact for collaboration between two Muslim nations is likely to lead to better understanding and improvement."

India felt terrified at the Turco Pakistan alliance. India, which wanted to show up herself as a leader of Asia, felt angry that Pakistan should have found a powerful friend like Turkey.

A great beginning. The announcement of the alliance was generally hailed as the "wisest step and the biggest event of Muslims and even of world significance

since the birth of Pakistan. It was stated as " a concerted effort to shake off the centuries' old weakness of a vital region which had once contributed so greatly to human progress........."

The Prime Minister of Pakistan described that the agreement " envisages the working out of methods not only of achieving collaboration but also of strengthening peace and security in the interest of all peace-loving nations. It was described as the "first great step towards strengthening the Muslim World."

8

THE ARAB LEAGUE

The Arab League came into being on March 22, 1945. The 1919 peace settlement had divided the Arab world in Asia (with the exception of Saudi Arabia and the Yemen) into British and French spheres of influence and established in them a number of separate states and administrations, (Syria, Lebanon, Iraq, Jordan and Palestine) under temporary mandatory control. By 1943, however, all these countries had substantially achieved their independence. An Arab conference met in Alexandria in the autumn of 1944 and formulated the 'Alexandria Protocol,' which delineated the outlines of the Arab League. It was found that neither a unitary state nor a federation could be achieved, but only a league of sovereign states. A covenant, establishing such a league, was signed in Cairo and 22nd March 1945 by the representatives of Egypt, Iraq, Saudi Arabia, Syria, Lebanon, Jordan and Yemen. Libya joined the League in March, 1953, the Sudan in January 1956; Tunisia and Moroco in October 1958; Kuwait in July 1961; Algeria on August 16, 1962.

An annex to the Covenant provides for the co-operation with Arab countries outside the League, in Arabian Peninsula and North Africa.

Origin. The formation of the League of Arab States in 1945 was largely inspired by the Arab awakening of the 19th century. They realised the prime necessity of keeping pace with the times. The idea of Arab solidarity among the Arab States is not something new. National feelings that were stirred during the World War I by the irresistible appeal of the principle of self-determination, gave place to the pan-Arab sentiment later on, which ultimately led to the conception of Arab Federation. The grim realities of the

World War II and the Palestine Problem brought the Arab States much closer to one another. All this led to the formation of the Arab League. The Western Powers have, however, been doing their best all the time to prevent it from being sufficiently powerful.

Constitution. The machinery of the League consist of a Council, a number of special committees and a permanent Secretariat. On the Council each state has one vote. The Council may meet in any of the Arab capitals and is normally convened twice a year in March and October. It is one of the functions of the Council to mediate in any dispute which threatens the peace between any of the League States or a League State and a country outside the League. The Council has a Political Committee which consists of Foreign Ministers of the Arab States. There are special questions, cultural affairs, communications economic and financial affairs. These committees are responsible for formulating draft agreements to be laid before the Council for consideration.

The permanent Secretariat of the League, consisting of Secretary-General, Assistant Secretaries and permanent staff, is in Cairo.

Object. The object of the Arab League is to draw closer the member-States and to co-ordinate their political action with a view to realising an intimate collaboration between them and safeguarding their independence and sovereignty. The League aims at ensuring a close co-operation between the member-States in economic and financial questions including trade, exchange, customs, currency, agriculture and industry, communications including railways, aviation, navigation and posts and telegraphs, cultural matters, social and public health.

Abdul Rehman Azzam Pasha, the ex-Secretary-General of the Arab League and the Palestinian Arab leader, Al-Haj Amin-el-Husseini, have played consipicuous parts in promoting Arab unity.

Collective security pact. On account of the experience of the Palestine war and expansionist policy of

the "Israel State." Arab League drafted a convention for collective defence and economic co-operation. On June 17, 1950, five countries of the Arab League—Egypt, Saudi Arabia, Syria, Lebanon and Yemen, etc., signed an Arab Collective Security Pact linking them in a military, political and economical alliance. The pact was signed in Alexandria. It stipulated that " armed attack " against one of them would be considered " aggression " against all. Individually or collectively the other signatory Powers would provide " all military and other aid" consistent with the existing obligations under the Arab League and United Nations Charter. The Security Pact came into effect on August 23, 1952.

The Arab League is opposed to the creation of Middle East Defence Command, as suggested by the Western Powers. They hold that the command is specially designed to confuse Arab opinion and detach Arab States from any potentially anti-imperialist alignment. It is also considered to mean to weaken the Egyptian stand and to induce those countries which are more favourable to collaboration with the West to exert pressure over Egypt to persuade her to modify the opposition in some degree.

New Arab collective security pact plan. Iraq, a member of Arab League, concluded Turco-Iraq Defence Pact on February 25, 1955, against the wishes of majority of the members of the Arab League who considered the Pact as a threat to the very existence of the Arab League. New Arab Collective Security Pact, as outlined in the following pages, was announced on March 6, 1955.

Pan-Arabism. Arab countries hold that Pan-Arabism is growing. As reported from Cairo, the growth of Pan-Arabism has been interrupted occasionally by the manoeuvres of the international power politics. "The whole area is so covetously wanted by some Power, and some groupings of Powers from outside, as a ball and a pawn in this game of international politics. It was stated that the greatest life-giving force for Pan-Arabism

is the fact that the West-created Israel is driving out the Arab inhabitants of Palestine, that West continues to support Israel through material aid and that any U.S.A. Government cannot possibly do otherwise because of the powerful Zionism in the U.S.A.

It was further stated that an Arab looks at, Israel as his enemy—the only enemy— and not Communism, as the West views it. Israel had been the most immediate and the gravest danger (of life and death) to all Arabs. As the Israeli Government has repeatedly claimed that Israel would have to restore the biblical map of Zionism from Iraq to Egypt covering Syria, Jordan and Saudi Arabia, all her preparations are designed to this end. ......If the West is unable to implement the U.N. resolutions, continue aiding Israel and bait the Arabs and, at the same time, try to isolate the transient sections—Egypt and Syria—it would be working against history. Aid has been thrown out as a bait for some countries to bite at. If they did not bite, an attempt was made to spear them and get hold of them by force. The Arabs know that it is a question of force between 1½ million Israelis and 40 million Arabs (and has to be a choice), the West are aiding Israel and providing it with more and more strength every day.

Towards Arab economic unity. On March 13, 1960, the Arab League Economic Committee passed a resolution calling for Arab economic unity and an Arab common market within the next 10 years.

The resolution provided for the establishment of a permanent technical office under the supervision of the League Secretariat to co-operate with the "Arab Unity Provisional Council" while taking necessary measures to achieve this objective.

The Council also approved the establishment of an Arab pipeline company, with its main office in Baghdad with a preliminary capital of five million pounds sterling.

The Council approved in principle the creation of an Arab navigation company, and referred the question to

competent authorities in the United Arab Republic, Iraq, Saudi Arabia and Kuwait for further advice.

The Council also recommended the promulgation of a unified oil law to organise relations between Arab States and oil-producing companies.

Arab unity. At a conference held at Shtura, the Lebanon, in September, 1960, it was expressed that all responsible people in the Middle East had realised the importance of Arab consolidation and the necessity of mustering efforts for it. Everybody knew for certain that Arab interests cannot be best served unless there was strict observance of the doctrine of Arab nationalism and recognition of the fact that Arab heritage and aspiration transcend all frontiers.

The appeal for unity and consolidation appeared, in the speeches of all speakers. The Libyan delegate said " We need to consolidate Arab Unity......" The Lebanese delegate was no less emphatic when he stressed the " great need for Arab co-operation and solidarity " and for whole-hearted collaboration in an atmosphere of amity and understanding. The Iraqi delegate, too, was truthful when he remarked that they were called upon that day to forget their disputes and differences in order to concentrate on constructive work and to ensure the success of their missions.

In Jan.-Feb. 1961 a Council meeting was held in Baghdad. All member states attended. A large measure of political solidarity was achieved and a number of important economic decisions were taken, including those to establish the Arabs Development Organistation, a joint world Arabs airline and a joint Arab tanker fleet company, each with a nominal capital of £ 25,000,000.

Arabs Common Market. The Arab Common Market came into operation on January, 1965. The agreement was reached in April, 1964. It was signed by Iraq, Jordan, Kuwait, Syria and U.A.R. It was open to all the Arabs League States. This agreement provides for the abolition

of customs duties on agricultural products and natural resources within 5 years, by reducing tariffs at an annual rate of 20 per cent. Customs duties on industrial products are to be reduced by 10 per cent annually. The agreement also provides for the free movement of capital and labour between member countries, the establishment of common external tariffs, the co-ordination of economical development, and the framing of a common foreign economic policy.

9

NEW ARAB COLLECTIVE SECURITY PACTS

On March 6, 1955, Syria and Egypt announced a new organisation to strengthen the military, political and economic structure of Arab world.

Provisions of accord. They agreed :

1. Not to join the mutual defence pact between Iraq and Turkey or any other " foreign alliance."

2. To set up a defence organisation and a joint Arab Economic Co-operation Board with a view to repelling any outside aggression against Middle East countries.

3. To establish a permanent joint Command to supervise the training of military forces placed under its order and to arm, organise and deploy them in accordance with joint defence policy.

The permanent Joint Command will co-ordinate the two countries' military efforts including armament factories and the communications required for military purposes.

The member-countries of the New Arab Collective Security Pact will undertake not to enter into foreign alliances without the prior consent of all the other members.

A supreme Economic Board will strengthen the economics of member-States preparatory to full economic unity.

Disapprovals and approvals.

The United States of America was reported to have sent a memorandum to Syria expressing disapproval of her agreement with Egypt for a new Arab Security Pact. The memorandum was said to have called for Arab League activities to be restricted to the cultural and social fields. It is said the United States Government believed the Arab League in its existing position is too weak to undertake

the responsibility for Middle East defence or establish a military organisation capable of carrying out such tasks. Syria and the Arab countries should appreciate the vital importance of Middle East oefence and realise that the only way of arranging adequate defence was for them to join Western alliances in the area. The memorandum was quoted as saying, " The United States Government believes the way which the Syrian Government is pursuing at present tend to jeopardise the interests of the Middle East region.

Al Gamhouria, an Egyptian daily, commenting on the reported America attitude said: "The reason behind the United States' interest in the Iraq-Turkey Pact is to force the Arabs to accept the presence of Israel in the area and co-operate with it in the economic and military fields."

Britain was reported to have told Egypt and Syria that she disliked their agreement supported by Saudi Arabia to set up a New Arab Security Pact. Britain's views were understood to have been given in diplomatic contacts in Cairo and Damascus. Britain was said to have disapproved the Egyptian-Syrian Agreement because she considered it was directed against the Turco-Iraq Treaty which both London and Washington Governments strongly supported.

Yemen. On March 10, 1955, the Yemen announced its whole-hearted support to the New Arab Pact which was proposed by Egypt. She rejected Western alliances and deplored the situation created by the Iraq Government by its new alliance with Turkey.

Saudi Arabia. King Saud of Saudi Arabia fully supported the Egyptian-Syrian Agreement for establishing a New Arab Security Pact. He regretted that certain Arab countries had made decisions contrary to our interest, but expressed confidence that they should see those countries return to the Arab fold. He said, " Arabs must sacrifice their very live to save Arab unity, no matter what the circumstances."

Egypt has been trying to align Arab countries against a Western-sponsored pact. The Egyptian Government newspaper, *Al-Gamhouria*, said, "The Arabs face the greatest crisis of their life since the creation of the Arab League."

Arab League. The Arab League Council held its 23rd ordinary session on March 7, 1955, in Cario. The Council set up 15 committees to study and report on various questions. The Council adjourned to await committee reports.

Syria-Egypt military pact signed. The Military Pact between Syria and Egypt held to be "the most bold official step ever taken towards achieving Arab unity on a practical, legal and correct basis" was signed in the third week of October, 1955. On October 11, 1955, the Syrian Government had approved the draft of the bilateral military treaty with Egypt.

It was reported that Syria hoped to conclude similar treaties with other Arab countries bordering Israel—namely Lebanon and Jordan—aimed at the "unification of the Arab defence front against the Israeli threat."

The Pact, it was reported, considered any aggression against one of the signatory States to be aggression against the other and provides for the unification of the commands of Egypt and Syria. The Supreme Command of the armies will be taken in rotation by Syria and Egypt. The Command will co-ordinate military scheme, armament training and the exchange of military information.

The Pact was stated to be purely defensive and not an aggressive agreement and followed the precedent set by the "Great Saladin" in the Middle Ages. It was intended to strengthen security in the Arab world.

Syrian-Jordan joint command. On November 2, 1955, Syria and Jordan agreed in principle to the establishment of a joint command over the Syrian Armed Forces on Israel Frontier and the Jordan National Guards—financed by the Arab Legion and composed of Palestinian and Jordanian volunteers.

Egyptian-Saudi Arabian military pact. Egypt and Saudi Arabia signed a bilateral military pact on October 27, 1955. Like the pact signed between Egypt and Syria, this Pact linked the armed forces of the two countries for mutual defence and stated that any aggression against one country would be considered aggression against both.

The Egyptian Premier said after the signing: "The Pact is a strong factor in the liberation of the Arab States and the progress towards complete independence and freedom from foreign domination and guardianship." Emir Feisal said: "Egypt and Saudi Arabia are bound together by stronger ties as today's formal act signifies."

This Pact was disliked by Britain.

Arab co-operation agreement. On January 19, 1957, Egypt, Saudi Arabia and Syria signed in Cario an agreement of aid to the Hashemite kingdom of Jordan to replace the British subsidy. The agreement was signed by President Nasser of Egypt, King Saud of Saudi Arabia, King Hussein of Jordan and Mr. Sabri-el-Assali, the Syrian Prime Minister. Under the Agreement, Jordan would receive 12,500,000 Egyptian pounds (about £12·8 million or 3,580,000 dollars) annually for the next 10 years. The payment will be made £5 million by Egypt, £5 million by Saudi Arabia and £2·5 million by Syria. The Arab Co-operation Agreement is valid for 10 years and is subject to renewal for a similar period if no signatory announced at least one year before its expiration.

The Syrian Premier declared that the Agreement was a "slap at the imperialists" Jordan's Ministers of State for Foreign Affairs emphasised that Jordan planned to terminate and not abrogate the Jordan-British Treaty which was signed in 1948 and had 11 more years to run. Since the Eisenhower Doctrine was announced, Egyptian leaders it was stated, had expressed fears that the United States was trying to isolate Egypt through some form of military or economic co-operation with Saudi Arabia, Jordan and the Lebanon. The Egyptians feared that US might offer King Saud sufficient economic help to enable him, unilaterally, to aid Jordan financially. In this way, the Egyptians

were stated to have argued that America was trying to move in through the back door to replace the British in Jordan.

Arab leaders' decision on other problems. A communique released on February 27, 1957, said that the four Arab heads of States, *viz*. Egypt, Syria, Saudi Arabia and Jordan took decisions on Arab problems :—

"1. To work for an immediate and unconditional withdrawal of Israel behind the armistice lines.

"2. To uphold in full the rights of the Palestine Arabs and the Arab sovereignty over their territories and their territorial waters.

"3. The necessity on the part of the aggressive States to compensate Egypt for all damages and losses caused through their aggression.

"4. To reject all attempts made with a view to reducing Egypt's sovereignty and rights over the Suez Canal as the Suez is an integral part of Egypt, her sovereignty over the Canal is absolute, and the freedom of shipping in the Canal is regulated in accordance with the provisions of 1888 Constantinople Convention.

"5 To condemn British aggression against the territories of Yemen and to assume an attitude of solidarity with Yemen in stemming this aggression.

"6. To support absolutely the right of the Arabs of Algeria to freedom and independence and their courageous struggle against the imperialist forces."

Saud-Feisal communique. On May 18, 1957, a joint communique announcing agreement between Iraq and Saudi Arabia for close co-operation "in the Arab and international fields" was issued following the talks at Baghdad between King Saud of Saudi Arabia and King Feisal of Iraq. They reached "complete agreement on safeguarding the two countries" independence against any foreign interference." The communique emphasised the need to uphold Arab collective security, condemned foreign intervention and described Zionism as a "danger to Arab

nations." A settlement of the Palestine Question and the granting to Arabs of their rights there was urged. The two Kings agreed to co-ordinate their oil policy and to "try prevent Arab and Muslim oil from reaching Israel." They regarded the Gulf of Aqaba as "a closed Arab Gulf linked with the Muslim holy places" and agreed to use all means in their power to prevent Israel attacking this Gulf."

Sudan-Ethiopia-Egypt military pact. It was reported on March 2, 1957, that negotiations were underway between the Sudan and Ethiopia and Egypt. President Gamal Abdel Nasser was reported to have discussed the proposed Military Pact. Emperor Haile Selasse's visit to Cairo was also expected.

Saud-Hussein communique. King Hussein of Jordan and King Saud of Saudi Arabia announced on 13th June, 1957, that they had endorsed the Syrian-Egyptian policy of positive neutrality and no adherence to foreign pacts, and also military collaboration between Jordan, Saudi Arabia, Syria and Egypt. They also said that they would labour to support the Algerians in their heroic struggle against imperialism.

The two Monarchs also pledged to :—

(1) Strive to secure for all Arab nations full independence and complete sovereignty free from any foreign domination.

(2) Safeguard the independence of Jordan and Saudi Arabia and preserve the heritage and spiritual values of Islamic and Arab peoples.

(3) Support full Arab rights in Palestine.

(4) Support their brotherly Arab Algerians in their struggle against French imperialism.

(5) Reaffirm the principles of self-governments recognised by all nations.

(6) Abide by the Arab League Charter, UN Charter, Arab Collective Security Pact, resolution of the Bandung Conference and the Arab Solidarity Agreement.

(7) Regard the Gulf of Aqaba as Arab territorial waters and defend Arab sovereignty over the Gulf in co-operation with other Arab States.

(8) Reject the view that the Gulf is international or that Israel or any other nation has any right on it.

(9) Promote investment of Saudi and Jordanian capital in econcmic projects.

(10) Both kingdoms also pledged to promote the pure atmosphere of brotherly relations among Arab sister states and tighten nationalities among them on the basis of true co-operation and complete understanding.

(11) Continue their efforts to repair the Hedjaz Railway to Medina and to expedite " this highly vital project to serve the Islamic world."

The communique, which was released simultaneously in Riyadh, the Saudi Arabian capital, and Amman, declared that the defence of Arab world should be the responsibility of the Arab countries themselves. The two Monarchs stressed their adherence to the resolutions adopted by the Arab Big Powers at Cairo in February, 1957. They resolved to support military co-operation between the Arab States in defence against their mutual enemy according to he agreements already concluded.

Syrian comments. Syria held the King Saud of Arabia hoped that the joint communique published at the end of his talks in Amman with King Hussein of Jordan would help to avoid a complete rupture between Egypt and Jordan to the policy of positive neutrality, their determination not to join the Baghdad Pact and their desire to keep in force existing military defence agreement with Egypt and Syria. All this, it was expressed, was aimed at convincing Egyptian President Gamal Abdel Nasser that Jordan and Saudi Arabia had no intention of cutting themselves off from Egypt and Syria.

Syria, however, was considering breaking off diplomatic relations with Jordan. In fact Jordan was not considered to be placed indefinitely in quarantine.

10

REGIONAL CO-OPERATION FOR DEVELOPMENT (R.C.D.)

On July 21, 1964 Pakistan, Turkey and Iran decided at Istanbul to set up a regional organisation, named the Regional Co-operation for Development (R.C.D.) to accelerate the pace of development in the three countries and achieve collaboration between them at the economic level. The decision was announced in a joint communique issued on July 21, 1964 simultaneously in Karachi, Ankara and Teheran and signed at the Golambache Palace where once the Caliphate functioned.

In the *Golambache Palace* (Istanbul), on the Southern tip of the Bosphorus Strait which separate Asia from Europe, built in 1853 by Sultan Abdul Hamid, top statesmen of Pakistan, Turkey and Iran assembled for a while on the morning of July 21 to shape a new pattern of relationship based on regional collaboration and inspired by a new concept of Muslim nationalism. The great revolutionary leader and builder of modern Turkey, Mastafa Kemal died in this very palace, its room No. 71, on November 10, 1938 at 9.05 a.m. and all the six dozen clocks came to a dead stop instantaneously. Perhaps, there could not have been a better place to ponder over the past and work out the future of people living in the three countries.

Istanbul itself was the most suitable city for such parleys because of its most inspiring history. It still reflects the mighty efforts and achievements of those who once swayed the known world. It is the only city in the world which sits on two continents—Europe and Asia. Situated on seven hills, Istánbul has been a metropolis for 2.600 years--longer than any other city in the world. The 19-mile Bosphorus which separates Asia and Europe but connects Black Sea and the Marmora Sea makes Istanbul

an extremely beautiful city. The main effect is, however, created by its picturesque straits as by its great past which it may now be able to link with the future. Byzas the Megarian General, established the settlement in Istanbul in 657 B.C. Some ten centuries later, the Roman Emperor, Constantine chose it as the capital of his empire on May 11, 330 A.D. After many sieges it fell to the Crusaders in 1203 A.D. but on May 29, 1453 Sultan Mohammad Fateh captured the city. Istanbul, although not now the capital of Turkey, is still considered to be one of the greatest military feats in history. This city of palaces and mosques, of magnificent hills and rolling waters could not have falled to inspire the leaders of the three brotherly countries to work for higher objectives.

Joint Communique

The following is the text of the joint statement :

" The heads of States of Iran, Pakistan and Turkey, His Imperial Majesty Mohammad Raza Shah Pahlavi, Shah of Iran, His Excellency Field Marshal Mohammad Ayub Khan, President of Pakistan and His Excellency Cemal Gursel, President of the Republic of Turkey, met on July 20 and 21, 1964, in Istanbul.

" The heads of States reaffirmed their belief that regional co-operation is an essential factor in accelerating the pace of national development and in contributing to peace and stability."

"They expressed their conviction that the strong cultural and historical ties which bind the peoples of their countries and have already provided them with a solid basis for collaboration should be strengthened further and developed for the common benefit of the peoples of the entire region."

" To this end, the heads of States resolved that appropriate ways and means should be adopted to enlarge and develop further co-operation in the existing relations in all fields."

Points of Agreement. They agreed in principle :

(1) To free movement of goods through all practical means, such as the conclusion of trade agreements ;

(2) To establish closer collaboration amongst existing Chambers of Commerce and eventually a Joint Chamber of Commerce ;

(3) To the formulation and implementation of joint-purpose projects ;

(4) To reduce the postal rates between the three countries to the level of internal rates ;

(5) To improve the air transport service within the region and the eventual establishment of a strong and competitive international airline among the three countries ;

(6) To investigate the possibilities of securing close co-operation in the field of shipping, including the establishment of a joint maritime line or 'conference' arrangements :

(7) To undertake necessary studies for construction and improvement of rail and road links ;

(8) To sign, at an early date, an agreement with a view to promoting tourism ;

(9) To abolish visa formalities among the three countries for travel purposes ; and

(10) To provide technical assistance to each other in the form of experts and training facilities.

Expansion. Furthermore, the heads of States have directed to explore all the possibilities for expanding the co-operation in the cultural field among countries of the region. Cultural relations should be particularly oriented towards creating mass consciousness of the common cultural heritage, disseminating information about the history, civilisation and culture of the peoples of the region *inter alia* through the establishment of Chairs in Universities, the exchange of students, the grant of scholarships, the

establishment of cultural centres and the joint sponsoring of an institute for initiating studies and research on their common cultural heritage.

" The activities planned within the present scheme of collaboration shall be carried out under the name of the Regional Co-operation for Development.

" The heads of States expressed the hope that the spirit of perfect harmony and of regional solidarity which prevailed throughout the celebrations of the Istanbul Conference would ensure the attainment of the objectives formulated at this Conference.

" They are confident that the combined efforts of their peoples to this end will open new vistas of hope and opportunity for them and thus contribute to world peace and to the prosperity of the whole region.

Comments. The heads of delegations expressed their satisfaction at the results achieved, and described the Golambache decisions as a " good beginning. "

President Ayub said the talks were successful and he was very satisfied with the results. He added that unity and strength were absolutely essential for the stability and security of the region. He sincerely believed that the strength of Turkey, Pakistan and Iran would come through unity and increased relations between them.

The Shahinshah of Iran said that relations between their three countries had always been strong and these talks had proved that these relations would be further consolidated by more collaboration.

" They unanimously expressed the belief that this new collaboration should be carried out in a spirit of regional co-operation notwithstanding their activities as members of other organisations of a regional character.

Premier Ismet Inonu of Turkey also expressed satisfaction and maintained that co-operation between the three countries augured well for their future. Mr. Hasanali Mansour, Premier of Iran, welcomed the joint declaration and described it as the " need of the hour."

Mr. Farid Melin, Finance Minister of Turkey, said that Turkey had collaborated with Pakistan and Iran as an ally and friend. The Istanbul Agreement had bound them with economic ties as well, which was a happy beginning for fruitful co-operation. Preliminary studies had already shown that the economic co-operation could be beneficial for all.

He added that more studies, contacts and collaboration would not only cement the existing ties, but would also bring benefits in the economic sector, which were no less important

Observers saw in the Istanbul Conference a great step forward, because it had brought into existence permanent Ministerial Council of the three countries, which would meet regularly and by turns in the capitals of the three countries. They said it was a definite beginning at the culmination of an event which had been moving very rapidly. They said that at no international conference results had been achieved so quickly as at the tripartite talks between Pakistan, Iran and Turkey. They also attached special importance to the declaration that the three countries would be pleased to consider participation of other countries which indicated the spirit of Agreement and its regional character.

The Dawn dated July 24, 1964 in its editorial under the caption " A Great Beginning " stated : " The leaders of Turkey, Iran and Pakistan have set a unique record by evolving and finalising a far-reaching scheme of regional inter-dependence within a matter of days.........

" Istanbul has heralded the beginning of a great and noble experiment in multinational partnership for the realisation of common aims and aspirations."

The Pakistan Times dated July 25, 1964 in its editorial under the caption " Historic Pact " stated :

" The joint declaration issued by the three heads of States of Pakistan, Iran and Turkey is a historic event of great significance. As President Ayub, the author of this grand concept, has observed, it signals the fulfilment of the inherent desire of the Governments and peoples in this

region to forge a united front. It also paves the way for more fruitful relations among all Muslim countries. No international get-together in recent years has been animated by such a spirit of harmony as has marked the Istanbul Conference; it represented a bold and imaginative effort to harmonise the national interests of three Muslim neighbours. Political observers will not fail to note that in trying to evolve an enduring pattern of regional kinship the leaders have avoided inward-looking attitudes kept the door open for other neighbours to enter the common fold and chartered out a flexible framework of economic, cultural and technical co-operation which is not directed against any Power or group of Powers. Equally notable is the pragmatic approach to the problems of this region for no extravagant plans have been formulated to satisfy the common impulses; instead, the dictates of realism have been kept in view in giving a tangible direction to the common quest for co-operation."

Maulana Abul A'ala Maudoodi, Amir of Jama'at-Islami praised the Istanbul Pact on Regional Co-operation for Development and said it was a step in the right direction.

The Pakistan Organisation for Afro-Asian solidarity called upon the nations of Africa and Asia to intensify their struggle to liquidate and defeat economic imperialism of the developed nations of West by effecting agreements between themselves for Regional Co-operation for Development. It was hoped that the historic Agreement signed at Istanbul by the heads of the three States would create better understanding between the R.C.D. members and the Arab countries by eliminating the threat of Zionist economic penetration and expansions in the Middle East countries.

Progress made. The formation of multilateral development projects has been most encouraging. Nine R.C.D. groups on petroleum, trade, insurance, banking, air transport, shipping, rail and road communications, post and telegraphs, tourism and cultural co-operation chartered out several "joint purpose projects." Their reports were carefully reviewed by the Regional Planning Committee.

On October 17, 1964 the Ministerial Council of the R.C.D. which met at Teheran gave approval to the following recommendations of Regional Planning Committee :

Tourism. The three Foreign Ministers signed a tripartite agreement on tourism and bilateral agreements for abolition of visas for stays up to three months in the three countries. These arrangements were aimed at encouraging an increased flow of tourist traffic and providing practical facilities to the peoples of the three countries to get to know each other and to travel within region.

(The Regional Planning Committee of the Istanbul Powers recommended that the three regional countries should sign a comprehensive agreement on tourism by the end of October, 1964, and that Iran and Turkey should sign an agreement for the abolition of visas by the end of October).

Air transportation. (The Regional Planning Committee had asked the Committee concerned to study in details the measures required to establish a strong and competitive international airline, after considering the legal, economic, administrative and financial implications).

The Ministerial Council in pursuance of the decisions taken with regard to the decisions of setting up of a joint airline directed the Regional Planning Council to complete the necessary studies in this respect and instructed the Committee (group) on air transportation to submit a preliminary report to the Regional Planning Council as early as possible.

Shipping. (The Planning Committee recommended that the arrangements be made between Iran, Pakistan and Turkey for pooling their traffic and ships on specified and agreed routes as a first step towards the establishment of a joint maritime line).

The Ministerial Council expressed the hope that the Committee on shipping would complete their studies very early.

Roads and Railways. (The Planning Committee recommended that the remaining work on the Karachi-Kalat-

Quetta Road and the construction of the Lake Post (Quetta) Iranian border (Kirjawa Road) should be undertaken by the Government of Pakistan and completed by 1968).

The Council instructed that high priority be given to important roads and railways connecting the three countries.

Post, Telegraph and Telecommunications. (In the field of telecommunications the Committee endorsed the recommendations of the working group on post, telegraph and telecommunications for the reduction of postal, telephone and telegram rates. It further recommended that Pakistan and Turkey should route their surface letters and parcels *via* Tehran).

The Council decided, *inter-alia*, to reduce inter-regional postal and telegraph rates to the level of internal rates and that charges on telephone calls should be substantially reduced.

Banking and insurance. (The Committee accepted the need for reducing foreign exchange outflow on insurance services of the region, as a whole, and recommended the setting up of three re-insurance pools, one in each country. It also recommended that one or two banks in each country should study the feasibility and financial viability of undertaking banking operations).

A proposal to establish three insurance pools in the three countries covering re-insurance business in marine, fire and aviation was approved.

Petroleum. (The Planning Committee accepted the recommendations of the R.C.D. working group on petroleum regarding joint efforts in exploration, production, refining and marketing of petroleum).

In this connection, Iran expressed its readiness to extend to other two countries its co-operation to limits of its possibilites.

Trade. (The Committee, recognising the possibilities of considerable expansion of inter-regional trade, recommended for concluding a bilateral trade agreement between Pakistan and Turkey).

TRADE ACCORD

It also recommended that the possibility of concluding a wider agreement on domicile, commerce and transit trade between the three countries should be examined.

The Council expressed the hope that concrete steps would be taken as soon as necessary studies have been completed.

Cultural co operation and information. (The Regional Planning Committee recommended a detailed programme for cultural co-operation. The programme included setting up of a Regional Cultural Institute at Tehran).

The Committee also recommended the setting up of an Information Agency in the R.C.D. Secretariat to co-ordinate the joint programmes through Television, Press, Radio and other publicity media.

The Council had decided to establish a Regional Cultural Institute in Tehran early in 1965 with the object of carrying out systematic research in common historical and cultural heritage of the member countries.

The Council also noted with satisfaction the creation of R.C.D. Information Agency.

Joint purpose ventures. (The Planning Committee recommended that a beginning should be made by setting up three tourist promotion offices abroad to serve the joint purposes of the three countries).

The joint purpose ventures were to be referred as joint purpose enterprises.

TECHNICAL CO-OPERATION

Organisational structure and Secretariat arrangements. The Council gave approval for the establishment of Secretariat in Tehran. It would be headed by an Executive Secretary for a period of three years.

The Council noted with satisfaction and welcomed the interest shown abroad in the R.C.D and its purposes.

Work on R.C.D. highway. Two more national highways covering about 1,000 miles are under construction at an estimated cost of about Rs. 12 crore. One of them is Karachi-Khuzdar-Quetta Highway. It is to cost Rs. 4 crore and would take two to three years to complete. With the construction of this highway the time of journey between the R.C.D. countries is expected to be reduced by 150 miles. The other highway is providing direct coastal link between Pakistan and Iran *via* Karachi and Bandar Abbas (Iran). This will cost Rs. 8 crore and take four to five years to complete.

When completed, these two highways will also serve as subsidiary to the under-construction 34,000 miles Pan-Asian Highway. Work on this gigantic highway has been going on at a fast pace to connect as many as 15 countries *viz.* Pakistan, Iran, Turkey, Indonesia, Malaysia, Nepal, India, Burma, Cambodia, Ceylon, Thailand, Singapore, the two Viet Nams and Afghanistan.

Consortium for Consulting Engineers. In November, 1964 a non-official Consortium of Consulting Engineers of Pakistan, Iran and Turkey was formed to undertake execution of R.C.D. development projects. The R.C.D. Ministerial Council agreed to give the first preference to the Consortium for execution of the development schemes of the region. Each country would be represented by a member at the Headquarters of the Consortium, set up at Karachi.

Common market for R.C.D. States. Pakistan, Iran and Turkey may form a common market for further promotion of trade ties among the three countries. A start in this direction was stated to have been made with the formation of R.C.D. Chamber of Commerce which would help promote trade among the three countries. A great deal was reported to have been done for promotion of trade among the R.C.D. member countries which should help a lot in the formation of the common market.

11

NIGERIAN FEDERATION

Nigeria gained independence on October 1, 1960.

The Federation of Nigeria has an area of more than 3,39,000 square miles and a population of about three crores and forty lakhs (excluding the Trust territory of Federation, but which continued after October 1, 1960, under United Kingdom administration until the people would decide by plebiscite whether they wished to join the Federation or the neighbouring independent Republic of Cameroon. More than half the population living in the Northern Region is largely Muslim. The Eastern and Western Regions, together with the Federal territory of Lagos, the capital, form the southern part of the Federation. It has a long history of contact with Europe, through traders, missionaries and administrators.

Nigeria is mainly an agricultural country with an estimated 80 per cent of the working population employed on the land, mainly as peasant farmers. The principal export crops are palm kernels and palm oil (Nigeria is the world's largest exporter), groundnuts (again the world's largest exporter, supplying about 30 per cent of total internal trade), cocoa, cotton, rubber and bananas. There is an important livestock industry, and several minerals, including coal, tin, columbite, iron, lead and zinc, are mined. Industry confined itself largely to the processing oflocal raw materials. The Federal and Regional Governments took energetic measures to attract new industry and undertook major capital development plans.

Economic and social progress had been fostered in various ways by the United Kingdom, *e.g.*, in the form of financial aid for such projects as road construction, agricultural development, education and health and welfare

services ; technical assistance in the engineering and other projects ; in the prosecution of research, etc. A policy of Nigerianisation of the public services had been actively pursued for several years.

Trading stations were established by the Portuguese as early as the 17th century and later by the British and other Europeans. But these were mostly confined to ships or the factories on the various rivers. There had been little or no assertion of political claims by the White man until towards the end of the 19th century.

It was on January 1, 1900, that the British hoisted the Union Jack in Northern Nigeria. The sultans and emirs were liquidated from the various regions. Southern Nigeria was already being administered by the Royal Niger Company. In 1904, the British Government decided to unite the two Nigerias (*viz.*, the Northern and the Southern) and Lagos under one Government. Since then the British Government administered the territory as a whole.

Divisions. The Federation of Nigeria is divided into three administrative regions which are largely in accordance with the ethnic and political structure. The Northern Region is inhabited by about 18 million Muslims. The other two parts are the Eastern Region and the Western Region.

Political progress. The experience of the working of representative institutions in Nigeria dates back to 1922 when a Legislative Council was set up for the Southern part of the territory. It included in its membership the first elected Africans, four in number in any legislature in British Tropical Africa. This Council lasted, virtually unchanged, until 1947.

Richards Constitution was introduced in 1947, so-called after the then Governor, Mr. Richards. He considered that time was ripe for Africans to take a larger share in the management of their own affairs. He urged that while the unity of Nigeria must be safeguarded, provision must be made within that unity for the diverse elements which

made up the country. A big step was taken towards representative Government with the creation of three Advisory Regional Houses of Assembly, each with a non-official African majority, and a Central Legislature with a non-official majority drawn mainly from the Regional Houses.

Further constitutional progress was made on two considerations—fuller African participation in Government and greater Regional revolution. At each stage Nigerian opinion, expressed through its own leaders, decided the pace and timing of advance. A series of constitutional revisions considerably enlarged the elected elements in the country's political institutions and enhanced their powers. The revisions of 1951, 1954, 1957 and 1958 were instances in this respect.

Federal Constitution. In January, 1960, the newly elected Federal House of Representatives unanimously approved a motion asking for independence on October 1, 1960, and the Nigerian Independence Act was passed by the United Kingdom Parliament in July, with the support of all parties.

The new nation is a Federal constitutional monarchy, with the Queen as Head of State, represented in Nigeria by a Governor-General and by Governors in the Regions. The general lines of Constitution contained that the Federal and Regional Legislatures would continue to have two Houses—the Lower House elected and the Upper House appointed—and the Governments would be formed by the majority party, or coalition of parties in each Legislature.

The Federal Government was a coalition formed by the Northern People's Congress (NPC) (which had the largest number of seats in the House of Representatives and was also the majority party in the Northern Region's Legislature) and the National Council for Nigeria and the Cameroons (NCNC), the majority party in the Eastern Region's Legislature. The Action Group (which held a majority in the Western Region's Legislature) formed the official Opposition in the Federal Legislature.

12

TELEVISION IN PAKISTAN

It was on November 26, 1964 that television was introduced in Pakistan at Lahore. The television project was in the nature of a pilot one for three months until the semi-Government National Television Corporation was to come into being to take it over.

Full-fledged television stations—one each at Lahore, Dacca and Karachi—and three satellite stations—one each at Islamabad, Chittagong and Peshawar—were planned to be set up, depending on the success of the pilot project. The range of the pilot project in Lahore was from five to seven miles. But it was planned to be increased to 50 miles with the Corporation running the fully developed stations after the initial period of three months.

Mass communication. Perhaps more important achievement of man during his few centuries of civilization has been the combination of mechanised printing and broadcasting in sound and vision. It was in the nineteenth century that Printing Presses were introduced in the Indo-Pakistan sub-continent. Printing of books, newspapers and journals, as we know them today, however, came in the twentieth century. The cinema appeared in our sub-continent during this century. Sound-broadcasting, the most important landmark in the introduction of mass communication entered our homes some twenty years back. These "New Services" have made us conscious of all the important events that take place within our country and abroad.

Television is the latest means of mass communication. Although a branch of broadcasting, it is an important technical advance on sound radio. The outstanding fact about television is that it can project a picture simultaneously into hundreds and thousands of homes just ,the

same way as the radio. When sound and picture are presented to an audience simultaneously it attracts five times the attention commanded by sound alone. One of the immediate effects of introducing a television set into a household is that it seems to stop all other forms of social activity and engages the full attention of children and adults alike. Television, although initially a means of entertainment like radio, assumes the dual role of education and entertainment—education including information, of course. According to experts, the greatest contribution that the television has made in the developed nations of today is that it has helped produce a better educated and better informed society. By carrying the living glimpses of the way of life, customs and attitudes of various nations of the world into our living rooms a better understanding is caused in the world. Through various tele-casts (television broadcasts) public can know much more of the world than it was possible previously. It is due to the tremendous importance of television that quite a large number of the developing nations of Asia, Africa and Latin America introduced television in their countries soon after sound broadcasting.

Messages. The President of Pakistan gave the following message on the occasion of introduction of the Pilot Television Station at Lahore :

"The introduction of television in the country is a significant event. It provides yet another medium of enlarging the areas of knowledge and understanding of our people and for promoting in them an awareness of social and civic values essential to good citizenship. I trust that with the passage of time, as more television stations are set up, the range of this new medium would cover a wider field, enabling more and more people to benefit from its educational and instructional potentialities."

Aims and objects. Explaining the aims and objects and future programmes of the pilot project, the Central Secretary of Information hoped that if it succeeded it would be a "major breakthrough and help solve educational and social problems and would weld the people into

a strong, unified and enlightened nation, inspired by a common outlook on life."

Television's importance as a medium of education and entertainment needs no emphasis. It is specially necessary for developing countries like Pakistan which face enormous problems of literacy and mass intelligibility (though, curiously, it is the developing countries which can least afford television).

The principal objective before Government in introducing television in the country has been to provide such knowledge and information to our people as would help in the promotion of values based on our cultural heritage, in enlarging their mental horizon, in creating civic and national consciousness, in the integration of the two Wings of Pakistan, and in development of scientific bias in this age of science.

Through television we can present rare microscopic viruses and bacilli. It is possible to reproduce the entire life-cycle within minutes. We can demonstrate graphically complex chemical reactions or explain difficult physical theories. In the social sciences, it is possible to observe through television the geographic, economic and political conditions in other nations and also to see dramatic enactment of history. The visual medium can contribute a lot to economic development through programmes in agriculture and industry by showing the effects of fertilizers and insecticides or by teaching industrial workers operations of modern machines. Through television we can explain the social and economic problems of Pakistan and the plans to solve them, to show dramatically the disastrous effects of anti-social activities on the entire community and to enhance the regional understanding and national solidarity by showing the life, customs and cultures of the people of other regions. A general purposes television combines in itself technology, education, how business, salesmanship and commercial enterprise. Good skills are required in making ground surveys for the proper location of antenna towers, designing and constructing of

studios, installation, maintenance and operation of complicated equipment, training of personnel in various fields, production of a variety of live-programmes, selection and purchase of recorded material, making market surveys and surveys of viewers' reactions.

The introduction of television in Pakistan promises to be the dawn of a new era in mass communication. Great care has, however, to be exercised in the selection and presentation of programmes as television has immediate and vital impact on the viewer. There should be a fine balance between entertainment and education: both should be pleasant and calculated to appeal to average viewer. An attempt should be made to project Pakistan's own cultural and traditional values.

13

VIETNAM

Communism and capitalism are at war in different parts of the world; sometimes behind the scenes and sometimes quite openly. They have been testing their arms might in countries like Korea, Cuba, Congo, the Suez, etc. Vietnam is yet another country where both the idealogies have set their war machines against each other. The U.S.A., enjoying the blessings of other Western Powers, has come forward to help the South Vietnamese, whereas Communism is at the back of North Vietnam.

Strategic Importance. It is an irony of fate that the numerous small islands known as the East Indies should have formed a stage where big powers came to subjugate them (the islands) one by one and disappeared. Ancient China, Japan, and France came here one after the other and harnessed the islands to their own advantage. As a matter of fact the Mulacca Waterway, joining the Pacific Ocean and the Indian Ocean, enjoys a very strategic position in the South-East Asia. It serves as a bridge between the Pacific Ocean and the Indian Ocean. It is the shortest route to three continents (viz. Asia, Australia and America) out of the five continents of our Globe. This Waterway passes through Sumatra, Malaysia and Singapore. It connects Indonesia, New Guinea, Philippines, Thailand, Laos, Cambodia South Vietnam, North Vietnam with China and South Korea. Pakistan, India and Burma are linked with Australia through this Waterway.

American Interest. The U.S.A. knows that passing of Vietnam under Communist influence would mean Communist control of the Mulacca Waterway, and consequently loss of important American trade route. Thailand and

Málaysia would also go under Communist fold. Japan would not be able to obtain with ease its oil supplies from Western Powers. The U.S.A., is therefore determined not to allow this waterway go under the Communists in any case.

Vietnam is a part of former Indo-China. It is bounded on the North by the China Sea and on the West by Cambodia and Laos. Its maximum East-West extension is about 330 miles (in the North) and the minimum less than 40 miles (in the centre).

Geographically Vietnam is divided in three zones: North Vietnam, Central Vietnam and Southern Vietnam. Northern Vietnam includes different regions: the delta being 5,670 square miles. The mountains represent the end of the Southern China foldings. The long coastline of Central Vietnam is backed by a series of alluvial plains in front of the rocky bastions of the Annamite chain of mountains. In Southern Vietnam River de Saigon and its tributaries drain a group of hills and constitute a system distinct from that of the Mekong, which enters the Sea in several branches. Its coast is flat and muddy. The little island of Pouls Condore lies about 60 miles off shore.

The climate of Vietnam is that of tropical monsoon Asia: equatorial in the South, somewhat milder in the North.

The total population of Vietnam, in 1962, was estimated at 30,929,000. Density of population is greatest in the Tonking delta. The people of Vietnam belong to a Southern branch of the Mongoloid races. They are on average, a little taller in the North than in the South, where there is a stronger admixture of Indonesian blood. Their language is monosyllabic and can be written either in Chinese characters or in the *quoe-vgu* alphabet which is based on the Roman. Chinese civilization has had a great influence on their way of life. Usually Vietnam language is spoken there.

Rice is the chief export of Vietnam, representing more than 1/3 rd of the total value of the exports of the country. Prior to World War II only two countries in the world

exported more rice. Its other principal exports are coal, rubber and maize. Forestry, fishing and stock raising are mainly concerned with supplying the local markets; and the principal industries viz. cement, textiles and fish curing also serve local needs. Imports consist for most part of manufactured goods, machinery, automobiles and textiles. The major parts of the country are Haiphong and Cholon.

From July 21, 1954, Vietnam was *de facto* partitioned into two independent Republics.

(1) The Democratic (Communist) Republic of Vietnam in the North with its capital at Hanoi and having an area of 62,000 square miles and population according to 1960 estimate: 16,000,000.

(2) The Republic of Vietnam in the South with its capital at Saigon and having an area of 65,948 square miles and population according to 1962 estimate: 12,366,000.

Historical View. Excavations in the caves of Pho-Binh-Gia, of Luang-Cam and Minh-Cam in Vietnam have revealed skulls of a Negrito type in the lower strata and skulls of an Indonesian type, to be assigned to an early Neolithic period, in the upper strata. The Bronze-Age culture, represented by extant specimen of work testifying to a high degree of artistry, especially those of Dong-Son, belongs to the time Mongoloid peoples from China entered the country and mingled with the Indonesians to form the Vietnam. Iron seems not to have been worked before the first centuries of the Christian era.

Throughout the Middle Ages, greater part of the coast South of the delta of the Red River and North of that of the Mekong was held by Chams, an Indonesian people. Their kingdom, Champa, which had its capital first at Indrapura near Tourane, then at Vijaya near Qui Nhon lasted for more than 12 centuries.

In 1470 A.D., the Vietnamese, who in the previous century had already advanced their frontiers to a line South of Indrapura, won a decisive victory over the Chams.

Thereafter, Champa disintegrated till by the end of the 17th century it no longer existed as a political entity. The Mekong delta itself was part of the Khmer kingdom in the Middle Ages. The mountains, meanwhile, were occupied by primitive tribes of Indonesians called Moi.

European contacts with this country began with the visits of Portuguese ships in the 16th century. In the 17th century Dutch and English merchants established contacts at Hanoi and catholic missionaries went to work throughout Annam.

The insurrection of the Tay-Son in 1773 overthrew both the Trinh and the Nguyen, but a member of the Nguyen dynasty, Nguyen Anb (1762-80) succeeded in organizing a counter-revolution in the South and with the help of a French Bishop and a member of French Officers defeated Tay-Son, advanced northward, entered Hanoi and in 1802, under the name of Gia-Long, became emperor of a unified Vietnam (Annam). Gia-Long's policy of friendship with France, however, was abandoned by her successors and terrible persecution of the Christian was started This led to intervention and eventually to conquest by France in the latter half of the 19th century and thus to a long period of French rule before Vietram recovered its independence after World War II.

Partition. The French Premier, in June 1954, decided to put an end to the war in Indo-China. As there was no hope to maintain French rule there, he proposed to negotiate an armistice. This was signed at the Geneva Conference on July 21, 1954 at which France, the United States, the United Kingdom, Soviet Russia, Communist China, the two *de facto* states of Vietnam, Laos and Cambodia participated. The armistice brought an end to the 7 years' war in the former Indo-China and among other things "provisionally" Vietnam into a Communist State on the North and a National one on the South, divided by the Ben-Hoi river, near the 17th parallel. Elections in both parts of Vietnam were to be held within 2 years, with the aim of recreating a unified government. No elections, thereafter took place. Through foreign intervention tension between

the two states increased. Eventually, it resulted in the outbreak of a war in Vietnam.

War Events. Conditions deteriorated in both the parts of Vietnam. Their forces were set against each other. The South Vietnam was supported by America and her Allies while the North Vietnam enjoyed blessings of Communist world. America started air raids on North Vietnam in February 1965.

While giving an account of war casualties in North Vietnam the American President said on December 7, 1965 that the United States troops had till then counted 231 bodies of Viet Cong killed in the battle near the Michel rubber plantation, North of Saigon. Most of the guerillas dead appeared to have been killed in air strikes.

Some United States infantry were ambushed by a heavy guerilla force of about the same size. Casualties among the hardhit Americans are described as moderate. A United States spokesman said that more than 50 shells had been bobbed into the area but U.S. marines hit back with artillery fire and silenced the attack. The United States B-52 bombers attacked 2 suspected Viet Cong targets in the highland area in Drang Valley battles and in Tay Ninh province.

Viet Cong sank or damaged over 100 United States and South Vietnam boats in the first nine months of 1965. Two American sailors were killed and 29 injured when fire broke out aboard the 7th Fleet Air-craft carrier U.S.S. Killy Hawk.

Paratroops of the American 101st. Airborne Brigade on February 8, 1966, fought a violent hand-to-hand battle with the Viet Cong in the coastal province of Pho Yen. A company of paratroops stormed fortified Viet Cong positions and occupied a first row trenches. The Viet Cong suffered 63 dead and 45 killed. American losses were moderate.

In the month of March 1966, United States Air Force and Navy aircraft carried out their heaviest raids on North Vietnam since the air offensive started in February 1965.

Anti-Government Struggle in South Vietnam. The powerful Buddhist church formed a special cabinet to direct an organized struggle against South Vietnam's military Government on April 9, 1966. Demonstrations and riots had been sweeping South Vietnam, with demands that the military Government be replaced by civilian rule.

U.S. Planes use Napalm Bombs. American aircraft using Napalm bombs and machine gun fire had directly attacked soldiers in North Vietnam for the first time on August 7, 1966 The American planes also bombed one of the biggest power stations of North Vietnam on August 12, 1966 and raided 12 oil depots.

Daring Viet Cong attack on U.S. Positions. A Viet Cong "suicide squad" staged a bold mortar attack on August 13, 1966 on a United States motor vehicle depot on the edge of Saigon and caused heavy damage. Viet Cong claimed that they killed 423 United States soldiers and wounded 200 others in a fortnight by attacking a base camp near Saigon.

On October 16, 1966, North Vietnamese saboteurs blew up a militia dispensary close to Quang Ngoi city, killing militiamen and civilians and wounding 14. North Vietnamese had also destroyed the 1500th American planes over North Vietnam on October 19, 1966.

Sharp Ground Fight. • On November 4, 1966, Combined American and South Vietnamese troops tangled with North Vietnamese units in sharp ground fighting near the Cambodia border while the air war in the North continued at a quickened pace.

North Vietnam forces claimed to have killed one lakh troops including 45 thousand Americans and about 8 thousand Koreans in the first 9 months of 1966.

Manila Conference and thereafter. The 7-nation 2-day Manila Conference concluded on October 25, 1966. The 7-nations participating in it were : The United States and 6 allied nations viz. South Vietnam, South Korea, New Zealand, Australia, Thailand and the Philippines."

The Conference on its conclusion issued the summit communique.

The Manila Conference in its final communique proclaimed the determination of the participating nations to pursue the "struggle against aggression in Vietnam." The Manila summit's only proposal to North Vietnam and to the Viet Cong was an offer to withdraw U.S. and allied troops from South Vietnam "not later than six months after the other side withdraws its forces to the North."

The Conference issued three final documents: (1) The joint communique (2) A statement entitled. "Goals of Freedom," and (3) A "Declaration on peace and progress in Asia and the Pacific."

In the joint communique, the 7 Allies underscored two other conditions for the withdrawal of allied troops: namely cessation of Communist infiltration and a decline in the "level of violence," in South Vietnam. South Vietnam insisted that any negotiations to end the Vietnamese conflict should incorporate effective international guarantees. The Communique asserted that the South Vietnamese people were ready to ask their allies "to remove their forces and evacuate their installations on the military and subversive forces of North Vietnam are withdrawn." The 7-nations then emphasized that their forces "will be withdrawn as soon as possible and not later than 6 months after the above conditions have been fulfilled. The communique also declared that it was vital to maintain close consultations through diplomatic channels. There would be regular meetings among allied Ambassadors in Saigon with the government of Vietnam.

The "goals of freedom document" just one page enumerated objectives: (1) to be free from aggression (2) to conquer hunger, illiteracy and disease (3) to build a region of security, order and progress, (4) to seek reconciliation and peace throughout Asia and the Pacific.

The 3-page "declaration on peace and progress in Asia and the Pacific" proclaimed: "Declaration of principles": (1) Aggression must not succeed. (2) We must break the

bonds of poverty, illiteracy and disease. (3) We must strengthen economic, social and cultural co-operation within the Asian and Pacific region. (4) We must seek reconciliation and peace throughout Asia,

North Vietnam on October 26, 1966, rejected the 7-nations Manila Conference's proposals for peace in Vietnam as "isolent" and repeated its call for immediate withdrawal of all United States troops f om South Vietnam. The North Vietnam authorities said that the conference's proposal for withdrawal of North Vietnam's troops "demand for the Vietnamese people, to lay down their arms and surrender to the American Aggression." This "peaceful" salution was "still more cynical and insolent than earlier conditions."

North Vietnam had rejected the Manila Conference on Vietnam as sham and reiterated that war could only end on North Vietnam's known terms. The President of North Vietnam commenting on the Manila Conference described that America and her allies at the Conference tried "to peddle their sham peace while actually trying to step up the war. He added : "The United States imperialists must put an end to their aggressive war against Vietnam, stop for good and unconditionally the bombing raids and all acts of war against the Democratic Republic of Vietnam, and withdraw all the troops of the United States and its satellites from South Vietnam. Then only peace will return to Vietnam."

"United States to Blame for World War Threat." On November 7, 1966, Russia charged that the United States was to blame for a new threat of universal war and said that China was encouraging the Americans to commit new crimes in Vietnam and other parts of Asia by opposing to a United Communist front in rebuffing American aggression. He said that because of increased world tension, the Soviet Communist party was showing "tireless concern" in raising Russia's defence potential. He stated that Russia had rendered and would render all-round assistance to the North Vietnamese people.

CHAPTER 14

THE MIDDLE EAST CRISIS

In the early hours of June 5,1967, Israel launched an unprovoked attack against the United Arab Republic along the 117-mile Senai border. She also started an aggressive war on two other sectors *viz.*, the Jordan-Israeli front where the Jordanian Army was engaged under the command of King Hussain himself, and the Israeli-Syrian front. The Israel also carried out major surprise bombing raids on Cairo. The Israeli Air Force made quite surprise attacks on more than 25 air basis in the United Arab Republic, Syria, Jordan and Iraq, simultaneously.

This Israeli blitzkreig employed a new fragmentation bomb that bombs in on metal with great accuracy. This weapon helped knock out the bulk of the tanks together with some 450 Egyptian, Jordanian and Syrian planes on the ground.

The Arab states had to face the Israeli onslaught which was carried out under the direct and military support of foreign powers. Severe fighting developed. Tank battles on the UAR-Israel front ensued. On the very first day, the biggest ground battles in the localities of Khum Yunes el-Kantilla raged. A number of Israeli tanks were destroyed. Syria and the United Arab Republic shot down 150 zionist planes. The brave forces of the United Arab Republic repulsed three heavy enemy attacks. The Arab forces bombed Israeli positions and military installations.

Syria, too, fought well and pierced into the Israeli territory. It was only after accepting the cease-fire, however that the cunning and treacherous Israelis advanced on this front and continued till they seized some Syrian territory.

War Events:

June, 5. Arab countries threw themselves into war with Israel on June 5, within hours of the United Arab Republlc (UAR) declaration that she had been attacked. Israeli and Jordanian troops faced each other. Iraqi troops entered Jordan. Turkey refused to support the USA. The USA declared to help Israel at any cost. Iraq joined the UAR-Jordan defence pact. Israeli and Jordanian Air Force planes clashes took place. Israeli aeroplanes ran away. The USA stated that the Middle East Crisis would be solved by the Security Council.

June, 6. Pakistan condemned of Israel's naked aggression against the Arabs. The USA, Britain and France declared themselves to be neutral. Soviet Russia declared that she would take part in the war if any Western power intervened. On all fronts Israeli attacks were repulsed. Fourteen Israeli pilots were captured. Syria. Lebanon, Iraq, Sudan, Algeria, Kwait, Yemen and Jordan declared war. Furious battles took place in Jerusalem. Arab forces conquered several places. Israel bombard Cairo and Amman. One hundred and sixty Israeli planes were shot down. Israel made an unprovoked attack on the UAR. A violent air raid was made on Cairo. On the Jordan front heavy raids were made by Israel, In Sinai sector Israel launched a severe attack. Two more air raids were made at Cairo. Israeli planes bombarded the Air Port of Sharm El-Sheikh, Syrian Air Force bombarded heavily Israeli air port Haifa and oil refinery was put ablaze. Kwait, Lebanon, Algeria and Morocco declared war against Israel. Jordan conquered the strategic Jabal-al-Kibr and by advancing towards the south captured Qudas post. Israeli planes launched an attack on Lebanon air port. Saudi Arabian troops joined Jordan. The UAR repulsed heavy air raids of Israel. Cairo radio announced that one hundred and thirty seven Israeli planes were shot down. The Jordan Air Force bombarded Tel Aviv. The UAR forces in a hid to cut off Eliot port from the rest of Israel launched a heavy attack in Sinai.

Sector to the south of Jordan and occupied vast territory of Israel. Syria occupie a well-known settlement of Shear-Yashuv and advanced towards Tel-Aviv. Iraqi forces advanced towards Nazareth, a town only eighteen lmesi from Tel-Aviv. A contingent of 2000 Algerian troops reached Jordan. Israel claimed entrance into Jordan territory of Jerusalem. She also claimed occupation of El-Aresh and Ghaza in the Sinai Desert. UAR Navy bombarded Tel-Aviv. The UAR (United Arab Republic) wiped out a full brigade of Israel on the Quntila front. King Hussain's palace was heavily bombarded by Israel. Al-Ahram" said on June 7 that Britain and the U S. were taking part in air operations against Jordan because this was the most sensitive front. Four hundred planes were in action on the Jordanian front on the night of June 6—too many for Israel to provide alone while engaged in fighting.

June, 7. Pakistan offered any sort of help which the Arabs wanted. The Arabs oil supply to USA and Britain. The Suez Canal was totally closed. President Abdel Naseer sent a message to King Hussain that Israel would have to deal with lacs of Nassers to reach him (The King) Eba Eban, Irsaeli Foreign Minister, *after realising the serious situation with which his country was faced*, reached ; New York. British aeroplane carries left Cyprus for Israel. Throughout night a fierce tank, gun, and armoured car battle continued in Jerusalem. Tunisia declared war on Israel. King Feisal appealed to the Muslim world for Jehad in support of the Arabs.

June, 8. The Arabs rejected a U.N. appeal for a cease-fire. Israel advanced towards the Suez. Syria made advance towards Nazarath. A severe tank-battle took place at Sherm-al-Sheikh. Iraq bombard Tel-Aviv a number of times. Chou-En-Lai reiterated that seventy Crore Chinese were with the Arabs. Sudan, Iraq broke diplomatic ties with the U.S.A. and Britain.

June, 9. In the wider interests of world peace Jordan and the U.A.R. accepted the cease-fire resolution of the U.N.O. The U.S.A. fleet had reached. Alexandria. After

the cease-fire Israel occupied Gulf of Aqaba. The U.S A charged U.S.A. and Britain alliance with Israel and by way of proof stated that :

(*i*) On May 29, 1967 Levi Eshkol Israeli Premier made a statement expecting the U.S.A and Britain to act outside the U.N to break the Aqaba blockade.

(*ii*) On May 27, on return from Washington, Eba Eban, the Israeli Foreign Minister, stated on radio in France that the U.S A would help any action taken by Israel to break the Aqaba blockade.

(*iii*) The purpose of Britain Premier, Mr. Wilson's visit to Washington was to discuss and settle details of alliance with Israel.

(*iv*) King Hussain himself saw on radar screens two aircraft American carriers standing in the Mediterranean off Israel from which wave after wave of planes were taking off. The U.A.R forces saw British and American aeroplanes guarding the air space over Israel. Two main features of the Anglo-American air umbrella were mentioned.

1. American and British planes would operate only in Israeli air space so that if a plane were brought down there would be no incriminating wreckage outside Israeli territory.

2. American and British planes would defend Israeli bases and territory leaving the Israeli air force free for offensive action. Moreover, British Canbera jets bombarded the U.S.A defence line.

(*v*) On the Israeli coast American aircraft carriers were stationed. On June 8, a large number of American planes reached Israel from Libyan and similar American military bases.

(*vi*) U.S.A and Britain made streneous efforts towards declaring Aqaba an international waterway.

(*vii*) The U.N. Secretary general reported quite clearly that Israel was the aggressor in this war. But the U.S.A was not aware as to who was the aggressor.

(*viii*) Most of the planes attacking airports in the Suez Canal area had no markings and this raised "many possibilities".

(*ix*) On the persons of Israeli pilots who were captured were maps manufactured from British Defence belonging to the Ministry "originals". Others had aerial Photographs of U.A.R. positions which could only have been taken by the United States.

(*x*) An Israeli pilot Mr. Abraham had confessed on Syrian Television that before the Israeli attack seventeen British Bombers had reached and they took major part in the attack.

(*xi*) The U.S.A at once granted leave to her airmen in Europe and sent them to Israel to participate voluntarily.

(*xii*) On June 7, the British Foreign Minister said in Parliament that restrictions on sending of war weapons to the Middle East had been removed. As the Arab countries were not on good terms with the Western countries, the weapons were all supplied to Israel.

June, 10. President Abdel Nasser resigned for being responsible for the adverse situation in the War. Field. Marshal Abdel Hakeem Amer and the Defence Minister also submitted their resignations. Vice President Zakriya Mohaiuddin was announced to be the U.A.R President. The public and Muslim countries represented against the Abdel Nasser's resignation. Zakriya Mohaiuddin refused to take charge of the U.A.R Presidentship. President Nasser, was forced back to remain the President.

After accepting the cease-fire Israel treacherously continued aggression and took certain areas of the U.A.R Jordan and Syrian territories amidst Arab protests to the

U.N.O. Israeli forces reached the banks of the Suez Canal.

Foreign intervention. United Arab Republic, Jordan and Syria complained of the nacked intervention by the United States and Britain. It is not a hidden fact that large number of aeroplanes and tanks arrived in Israel just on the eve of the onslaught. In addition, the arrival of volunteers from America, United Kingdom and various European countries was reported to have been admitted by Israel.

Jordan had accused Israel of having used Naplam Bomb in large numbers. It was not a war between the Arabs and Israel. It was a war conducted for the mastery of Arab world by remote control through a portage. in order to establish firmly and finally a stronghold on the whole of this strategic region which has mostly been dominated by the strongest world power. Due to internal rifts or powerful external factors from abroad and without solidly integrating the human and material resources particularly the natural wealth of the region itself the Arabs could not possibly undertake an offensive.

This is not the occasion to apportion blame and widen the gulf created by past internal failings in the face of external pressures.

There is enough to realise that until a conscious and wilfull effort is made to get this vast Middle East region knit together, particulary, in the spheres of economic and military, the world powers will continue to dominate it either directly or by proxy.

Background. In less than a decade Israel for the third time plunged the Muslim Middle East into war. Forced, as we have been in pursuit of her expansion designs was in search of a chance for aggression on the middle East. She availed that chance when the United Arab Republic towards the middle of May. 1967 asked the Secretary General of the U. N. to remove the Emer-

gency Force from her territory and closed the Gulf of Aqaba to Israel on May 22, 1967.

Towards the Middle of May 1967, the United Arab Republic asked the U.N. Secretary General to remove the Emergency Force. The Gulf of Aqaba was also closed on May 22, 1967. Ban was imposed on ships of third parties carrying strategic goods to Israel. The United Arab Republic was quite justified in so doing; firstly, because the UNEF had been permitted to take up positions on UAR'S soil and Israel had never allowed the UNEF on her side and secondly because Israel's right to passage through the Gulf of Aqaba had not been derived either from some established usuage or from an agreement with the UAR. The Gulf of Aqaba is entirely an internal Arabs waterway. The Aqaba question was taken to the United Nations for settlement and the Arab world and the rest of the world were waiting for a peaceful settlem nt of the issue. But Israel did not wait and being in league with other foreign powers started free aggression against the Arabs on June, 5, 1967.

The United states of America reacting to the UAR'S decision of the blockade of the Gulf of Aqaba for Israeli ships said that she regarded the Gulf and the strait of Tiran leading to it as an International waterway. She emphasised that any Interference with the free passage of ships there would be regarded as a serious matter. She had warned the United Arab Republic that she considered the blocking of the Gulf of Aqaba to Israeli ships as an act of aggression and that she would use all measures in and out of the United Nations to counter it. It was considered that the United States would not rule out the use of force if all other possibilities were exhausted.

Britain reacted to UAR'S decision of the blockade by declaring that the Gulf of Aqaba was an International waterway that should remain open to all ships of all nations. If any attempt was made to close the straits, Britain would promote and support any international action, through the United Nations, to secure the free

passage. The British Government had alerted her troops and warships stationed in the Mediteranean in support of Israel.

Israel. The reaction of Israel in this case was also very tough She had said : "We cannot allow the straits to remain closed. We take an extremely serious view of this. We have pointed out many times that any closure of this kind would be something we could not permit to happen. We consider it an act of war. Israel would bring diplomatic pressure to make it clear that should the Tiran straites remain closed, it would mean war in the area."

America and Britain being in league with Israel, circulated among the world's maritime powers a declaration to the effect that the Gulf of Aqaba was an international waterway and that all signatories were entitled to the right of free and innocent passage. The United States of America termed the blockade of the Gulf of Aqaba an act of war, whereas Israel called it an aggression. France and Turkey did not agree to it. The United Arab Republic said : "Army collective action taken by these (maritime) Powers constitutes an aggression against the United Arab Republic's sovereignty that exercises legitimate rights over its territorial waters "

Israel, backed up by the Western Powers assumed the 'heroic' role of striking first at the Arabs on June 5, 1967, without declaring a war.

Attack was made on the 117-mile Sinai border. Simultaneously, advances were made in Jordan and Syria. The Air Forces of the UAR, Jordan and Syria were taken unawares. She waged a highly mobile warfare and inflicted maximum damage on the Arab States.

The U.A.R. President neither wanted war nor perhaps expected a full scale war. In case he had, he could have adopted the pre-emptive strategy of striking first rather than waiting for the Israelis to knock out his air force on the ground.

Israeli aggressive career. The first Jewish–Arab war had begun on May 15, 1948 after the British Government terminated the mandate over Palestine on May 14, 1948, when the Jews had been made strong enough by the Western Powers to resist the Arabs. The Arabs termed this act as aggression and rose up in self-defence. Israel with the support and blessings of the Western Powers waged war against the combined armies of Egypt, Jordan, Iraq, Lebanon and Syria. A cease-fire was brought about after 8 months. The Arabs could not defeat Israel as she was planted and backed-up by America, Britain and other Western Powers. The Arabs, however, did not recognise Israel.

It may be recalled that the second Israeli invasion of the Arab world was undertaken on October 29, 1956, when she in a lightning attack had occupied most of the Sinai peninsula Britain and France had joined the war on October 31, 1956. The United States was busy in her Presidential elections at that time. As a matter of fact, the western aggressive designs and acts against the United Arab Republic were camouflaged under the garb of Israeli-U.A.R. conflict. Britain and France occupied Port Said on October 31, 1956.

It may be remembered that the Western Powers in their bid to cow down the U.A R., on the one hand had brought out the Trojan Horse of Israel, in the filed, and on the other hand, it had alerted the so called United Nations (which has virtually became a tool in the hands of Western Powers dominated by America). Then suddenly, as a result of Russian warning to direct rockets to the Western capitals if aggression on the Suez was not halted, the cease-fire followed. The British, French and the Israeli forces received cease-fire orders promptly from their governments.

Western Powers backed up Israeli aggression. The line of aggressive action adopted by Israel was decided in the higher circles of the American and British policy makers. They had fully assessed that Israel could not

succeed in a prolonged war, and was bound to lose. To make it sure that Israel wins, the advantage of surprised attack was to be obtained in the favour of the Israelis. This of course was achieved by political pressure of the United States and Russia. A note was sent to the United Arab Republic by the United States that in case the Arabs started war, they would stand responsible for consequences. Since the Soviet Union was playing a safe game, her advice to the Arabs was also not to start war, because in that case they would have readily been voted as aggrestors in the Security Council and thus things would have been worse.

Again the United States was all out, as usual, to support the Israelis. The Sixth U.S. Fleet stationed in the Mediterranean had drawn close to the Israeli territory. She had also issued a statement to the effect that the U.S. Government guaranteed the boundaries of the Middle Eastern states and that any change from the existing pattern was not to be tolerated. Britain also adopted the same line of action.

The Arabs, consequently, had to accept the Soviet line of action. But unfortunately the American diplomacy sidelined the Soviet Union It was made sure on the "hot line" that Russia would not take part in the war.

The United States gave large number of planes to the Jews. In order to show them that they were the Israeli planes it was quite an easv task. The only proces that the American planes had to go through was the painting and in no time they were Israeli planes. Thus the United States and the Israelis could easily deceive the world and could easily pretend that the huge number of planes used in the war were necessarily Israeli planes. In a similar way, the American pilots were used in the combat. moreover, there are more than six million Jews in America. A number of them could have been trained in the United States. Legally too, they were Israelis because of the double citizenship. And in order to have a clear idea as to who the Israelis are, one may add up the population of Israel and the American Jews who are

controling the key positions in the Government. Again volunteers came from other states, e.g. Great Britain, who could be Jews as well as others, but all excelent pilots to fight for the Israelis. In short, the air superiority of Israel could not possibly be achieved without the American and British help. However, all the help could be painted as Zionist help.

It is a common belief that all the planes that participated in the Israeli aggressive war, could not, possibly, fly from the Israeli bases alone. They were too few. The U.S. bases in the Mediterranean must have been used. The posture and activities of the Sixth U.S. Fleet cannot be considered to be above board. It had been established that the Israelis gave surprise to the UAR by attacking them from the north and west through the radar gap and by low flying. Such sort of a direction could have been imparted to planes flying from Libyan and Cyprus bases. The United States Army did not have to seek any permisssion from the various Governments, who had allowed air bases to be established in their territories.

The President of the United States, Mr. Johnson, on May 26, 1967. advised President Abdel Nasser not to start the war. The Premier of Soviet Russia, Kosygin also asked the U.A.R. President, on June 2, 1967, not to start war against Israel, Abdel Nasser was expecting that there would be diplomatic settlement under the Big Powers aegies rather than action in the form of war with Big Powers, blessings.

The Israeli Prime Minister, Eshkol, had made many visits to Washington on the eve of her aggressive onslaught on the Arabs. President Johnson and the Israeli Premier were said to have indulged in secret talks and were said to have provided for joint operations planned by both countries

Extent of success. In this war, though the Muslims of the Middle East have experienced a set back, the Western Powers have not achieved all their objectives either. They could not dislodge the President of the United Arab

Republic, Jamal Abdel Nasser, who is the symbol of anti-imperialism in the Arab World. It is again an interesting fact to note that the pro-west governments in the Middle East have not been able to express their policy openly to their public. This is not what the West desired. It has not been in the power of the West to overthrow the Syrian Government even after a war. But on the other hand, the Middle Eastern countries including the U A.R., Syria, Jordan, Iraq, Sudan and Alegria have achieved better mutual understanding and cooperation. The struggle in Aden against the British mounted. The anti-West spirit has gained great momentum. It is quite possible that this set back may result in a joint command of the Muslim forces and it will be an enormous success. This reverse may turn out to be a blessing of Allah in disguise. May be, without this reverse, the Muslims could not have learnt the value of training and proper leadership for their armies.

In a way, the war has brought more honour to the personality of hero of the Middle East, Jamal Abdel Nasser. Time has reorganised and so have the people. His honesty, integrity and political ability have been acknowledged. He has got a vision of world consciousness. A man who is familiar with his 'philosophy of Revolution' can easily appreciate his obstacles and understand his aims. He demarcates three spheres of political task the first is among the Arabs themselves, the second in Africa and the third in the Muslim world. He firmly maintains that in the beginning political work has to be organised and developed in every State. Then every State has to plan to uplift its people and only then co-operation between States can be achieved. He pleads, however, that the ultimate aim should not be lost sight of and that aim is the unity of all the Muslims who turn towards Kaaba for *Salat* (Knamazs) and who for the last 14 centuries have preserved a common *Salat* and a common centre. This integrity alone will give strength and stability to the Muslim world.

Arabs for recovery of lost territory. The Arabs stunned by the enormity of the setback were preoccupied with two things: the return of the territories seized by Israel and the nature and scope of the Arab nations response to the new situation. There was an almost universal urge in the Arab world for major policy reappraisal. This would take into account the setback, the continued Israeli occupation of Arab territories, and the political, and military preparations for the future. In considering the reappraisal, three clear trends were emerging, which were : the need for an effective joint Arab front, the almost uniform hostility to the United States and Britain, who were the two main supporters of Israel.

Khartoum accord. The Arab summit concluded on September 2, 1967 at Khartoum, the Capital of the Sudan. From the summit emerged an honouracle and realistic stand to close the ranks, pool the common resources and erase the effects of Israeli aggression. It was an imprecedent gesture of regional co-operation of the oil producing Arab States, Saudi Arabia, Kuwait and Libya agreed to extend economic aid to the chief victims of the war the UAR, Jordan and Syria. The aid of 150 million pounds sterling was meant to reinforce the shattered economics of the receipents. to compensate Cairo for the loss of revenues consequent upon the elosure of the Suez Canal and help Jordan till over the formidable problem of the Arab refuges.

A vitel decision was also taken to liquidate all foreign bases in their countries. They assessed that protecting the Arab interests and resisting untoward ptessures trom the outride world requires liquidation of foreign bases.

It was aggreed at the summit talke that no plan of action by the Arab countries can succeed without complete unity in their ranks. This vital need was ezclusively stressed. Saudl Arabia was stated to have even urged the Arab leaders to consolidate their tles with non-Arub Muslim countries, notabiy, Pakistan, Iran, Turkey and Indonesia.

Another achievement of the Khartoum talks was the sattlement of the 5-year old civil war in the Yemen by the Uuited Arab Republic and Saudi Arabia. The UAR and Saudi Arabla, thus laid the foundations of genuine co-operation on a lasting basis.

A consolidated Arab strategy , economic, political and military such as the one forme at Khartoum must by Allah's grace succeed in roiling back the ride of Zionism.

Chapter 15

THE YEMEN

The Yemen (Yaman), a republic, is situated in the south-western coastal region of the Arabian peninsula bounded north-west and north-east by Saudi Arabia, south-east by Aden and south-west by the Red Sea.

Yaman is an Arabic word which literally means "right hand", for all Arabia south of the Gulf of Aqaba was to the right from their standpoint of Alexandria, the Muslim geographers, however, viewing it from Mecca, confine the term to the regions south of Hejaz, including Asir, Hadhramaut, Oman and part of Southern Nejid.

Historical survey. Yemen had remained a part of the ancient kingdom of Sheba or Saba. The kingdom was founded in 950 B C. The country remained under the domination of Himyarite dynasty for 640 years from 115 B.C. to 5 2 5 A.D. The present deposed Imams claim their descent to this dynasty. In 5 2 5 A.D. the country was conquered by the Ethiopians, but their duration was comparatively short Ethiopians had to give way to the Persians who had become the Supreme power in the East.

Islam dawned over Yemen in the time of the Prophet Muhammad (may peace and blessings of Allah be upon him). The country embraced Islam and became independent from Persian suzerainty. It remained a part of the Muslim Caliphate.

In the ninth century, the country passed under the Rassid dynasty, which was founded by Imam Yahya-al-Hadi. This dynasty, with some interruption, remained in power till modern times.

The country passed on under the well-know Usman *khalafat* (Ottoman Empire) in 1517 and perpetually remained its territory for four long centuries.

The previous kingdom of the Yemen was founded by a revolt against the Usman (Ottoman) Empire instigated by the British and led by the Imam Yahya ibn Muhammad ibn Yahya Hamid-ud-Din in 1904, achieved its full independence in 1918. It lost its nothern province Asir to Saudi Arabia in 1934.

The Imam Yahya was assassinated in Feb. 1948. He was succeeded by his eldest son, Ahmed ibn Yahya ibn Muhammad Hamid-ud-Din. The British managed to establish diplomatic relations with Yemen through an Anglo-Yemeni Agreement. However, throughout the mid-1950, there were clashes on the frontier between Yemen and the West Aden Protectorate, which the Yemeni Government claimed as part of its territory. A United States company secured the first oil mineral concession ever granted by Yemen in 1955. Yemen also established diplomatic relations with the USSR in the same year and a trade agreement was later concluded between the two countries. Arms were imported from the Soviet Union and Czechoslovakia during 1957.

The federation of Yemen with the United Arab, Republic was formed on March 8, 1958, and was dissolved in December 1961. The king was murdered on September 26, 1962 and a revolutionary group headed by Brig General Abdullah al-Salal declared the country a republic. Then he became President of the Republic.

The Imam Ahmed's heir, the Imam Muhammad al-Badr, fled to the mountains where tribesmen joined royalists forces ; internal warfare between them and the Republican Government continued in 1965.

The sincere efforts of the beloved and the Great Muslim leader of the Middle East, President Abdel Nasser and Saudi Arabia's King Faisal brought about cease-fire the Republic of the Yemen on August 24, 1965.

President Abdullah al-Sallal deposed. The Yemeni President Abdullah al-Sallal was ousted in a bloodless military coup, while abroad, and a 3-man Ruling Council took power on November 5, 1967,

It was said that members of the council would occupy the Presidency in turn, beginning with Abdel Rahman al-Iriani. A new Republican Government had also been formed.

It was learnt on November 7, 1967 that the deposed Yemeni President had decided to remain in Baghdad and had taken up residence there.

The Yemen's new Republican Government was said to have promised in a communique on November 7, 1967 to create shortly a legislative council representing all sections of the population.

The Government also planned to set up a permanent council to bring different elements within the country together and a national defence council composed of few senior officers.

Yemen's new leaders. *Iriani*, head of the 3—man Republic Council was born at the turn of the century in the village of Iryan in the district of Ebb. He had been participating in the national movement, and was said to have had a part in the 1948 coup attempt which resulted in the assassination of Imam Yahya, grandfather of the present Imam Mohammed Al Badr. He was arrested with a number of others by the new Imam Ahmed and later released.

Iryani held several local positions and later became a Qazi (local judge) in Iryan. His first post after the Repnblican regime was established in September 1962, was the Minister of Justice in the first Republican Cabinet. He served in other Cabinets later on, and was also appointed a member of the Republican Council until he went over to Cairo in October 1966 He returned to Yemen late in October, but did not go to Sana'a. Instead, he and the others went to Hodeida, where they held a meeting with President Sallal, when an agreement was reported to have been reached for new changes in the Yemen.

Noman had been held in Cairo with the other Ye- exiles until his recent release. Noman carries s- importance in Yemen affairs, since he repsesents the

Shafei community which mainly resides in the southern part of the Yemen. The Shafeis are Sunni Muslims, and have been supporters of the Republic since the Imam had been of the rival Zaidi community, which is Shia. The 65-year old Noman was born at Al Turbat village in the Taiz district. He was one of the leaders of the Yemeni nationalist movement which had flowered in South Arabia. He was arrested several times while in Yemen by the Imam. He had led the campaign for modernisation of Yemen.

He became Premier in April 1965, but his Cabinet remained in office only for four months. Holding the Khamr Peace Conference, which was regarded as the first serious Republican bid for conciliation with the Royalist tribes, was one of his main achievements. In November 1965, he and Iryani led the Republican delegation to the Harad Peace Conference with the Royalists. He was later appointed a member in the Republican Council which he maintained until August 1966. He escaped to Cairo with a large number of dissident Republicans in October that year. He and the others were held there until recently and since then he has been in Beirut, living with his son, Mohammed Ahmed Noman.

Osman. The 65-year old Osman is the third member of the new Republican Council, and perhaps the least known. He was a member of the Republican Council until August 1966. He also served as Acting President during Sallal's frequent absence abroad. He was a member of the Republican delegation at Harad.

Mohsen Al-Aini. The 41-year old Mohsen Al-Aini, the new Premier, studied in Cairo, and at one time was a member of the Ba'ath Party. He is a socialist, and firmly believes in the establishment of socialism in the Yemen. He has had considerable trade union experience, having been associated with the Aden trade unions and their leader Abdullah Al Asnag. He was outside the Yemen when the September 1962 revolt took place, but he was appointed Foreign Minister in the first Cabinet formed by Sallal. However, he did not get along with Sallal, and late in [illegible]5 was appointed as permanent Yemeni delegate to the [illegible]d Nations. He resigned in 1966 year and lived in exile [illegible] while in Damascus. He was among the exiles who [illegible]d to the Yemen in October 1966.

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General Knowledge

Rs. 9.00

The book fully meets the requirements of all competitive Examinations in General Knowledge for Civil and Military Services—Central Superior Services of Pakistan (C.S.S.P.), Provincial Civil Services, Pakistan Military Academy (P.M.A.), Ministerial Services, etc., and Interviews. The book gives latest and up-to-date information on all topics. Examination questions selected from various competitive examinations have been added with brief solutions.

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